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ABSTRACT

The engagement of young Australians with school and individual and school-level influences on student engagement (defined as participation in extracurricular activities) were examined by analyzing data from the Longitudinal Surveys of Australian Youth. Being female, being from a higher socioeconomic background, and having professional parents were the individual-level factors associated with the highest levels of engagement with school. Students from independent schools had higher levels of engagement than did those in Catholic schools, who were more engaged than those in government schools. Students who planned on enrolling in tertiary study were more highly engaged than those who planned to leave school and go to work, and students at single-sex schools were more highly engaged than those at coeducational schools. Levels of engagement were higher where students believed that their school had a good school climate. Between-school

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differences accounted for almost 9% of the variation in students' engagement levels, thus indicating that what school a student attends does matter. School administrators can influence student engagement by providing extracurricular activities and encouraging (or expecting) student participation. The following items are appended: descriptions of the samples and populations; descriptions of the individual-level variables; the factor score regression weights; the constructed student and school-level measures; and multilevel models. (Contains 17 tables and 36 references.) (MN)

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Longitudinal Surveys of Australian Youth

Research Report Number 27

Student Engagement with School:

Individual and School-level Influences

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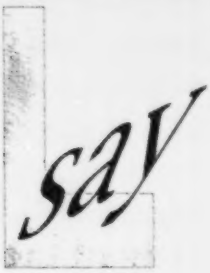

Longitudinal Surveys of Australian Youth

Research Report Number 27

STUDENT ENGAGEMENT WITH SCHOOL: INDIVIDUAL AND SCHOOL-LEVEL INFLUENCES

Sue Fullarton

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a research program that is jointly managed by ACER and the
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The views expressed in this report are those of the author and not necessarily of the Department of Education, Science and Training

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Contents

Tables iv

Figures iv

Executive Summary v

1. Introduction 1

   Defining and measuring *Engagement* 2
   Key questions 4
   Organisation of the report 4

2. Data and Methods of Analysis 5

   Data 5
   Construct measurement 5
   Defining and measuring *Engagement* 6
   Other constructed variables 7
   Influences on engagement 7
   Graphical techniques 10

3. Student and School Factors and their Relationship with Engagement 12

   Interactions amongst background factors 14
   Student attitudinal variables 16
   Teacher variables 17
   School-level variables 18
   Summary 18

4. Individual and School–level Effects on Student Engagement 20

   Engagement 20
   Variance Components model 20
   Student background and school contextual factors 22
   Other influences on school-level engagement 24
   Are influences on *Engagement* the same for males and females? 25
   Summary 29

5. Discussion and Policy Implications 31

References 34

Appendix 1: Samples and Populations 36

Appendix 2: Description of Individual-level Variables 37

Appendix 3: Factor Score Regression Weights 39

Appendix 4: Constructed Student and School-level Measures 40

Appendix 5: Multilevel Models 43

Tables

TABLE 1 MEANS ON *ENGAGEMENT* MEASURE AND PERCENTAGE OF STUDENTS PARTICIPATING AT LEAST ONCE A MONTH, BY STUDENT BACKGROUND FACTORS 12

TABLE 2 CORRELATIONS WITH ENGAGEMENT FOR STUDENT ATTITUDINAL VARIABLES AND ACHIEVEMENT, ALL STUDENTS 16

TABLE 3 CORRELATIONS WITH ENGAGEMENT FOR STUDENT ATTITUDINAL VARIABLES AND ACHIEVEMENT BY GENDER 17

TABLE 4 CORRELATIONS WITH ENGAGEMENT FOR STUDENT ATTITUDINAL VARIABLES AND ACHIEVEMENT BY SCHOOL SECTOR 17

TABLE 5 CORRELATIONS WITH ENGAGEMENT FOR TEACHER VARIABLES 18

TABLE 6 CORRELATIONS WITH ENGAGEMENT FOR SCHOOL-LEVEL VARIABLES 18

TABLE 7 PARAMETER ESTIMATES AND STANDARD ERRORS FOR THE ANALYSIS OF STUDENT ENGAGEMENT (STUDENTS WITHIN SCHOOLS) 23

TABLE 8 PARAMETER ESTIMATES AND STANDARD ERRORS FOR THE ANALYSIS OF SCHOOL-LEVEL ENGAGEMENT 25

TABLE 9 PARAMETER ESTIMATES AND STANDARD ERRORS FOR THE ANALYSIS OF STUDENT ENGAGEMENT (STUDENTS WITHIN SCHOOLS) FOR MALES 27

TABLE 10 PARAMETER ESTIMATES AND STANDARD ERRORS FOR THE ANALYSIS OF STUDENT ENGAGEMENT (STUDENTS WITHIN SCHOOLS) FOR FEMALES 28

TABLE A1 FACTOR SCORE REGRESSION WEIGHTS FOR ALL CONSTRUCTED VARIABLES 39

Figures

FIGURE 1 ONE FACTOR CONGENERIC MEASUREMENT MODEL FOR *ENGAGEMENT* 6

FIGURE 2 MODEL PROPOSED FOR EXPLAINING STUDENT ENGAGEMENT USING LSAY DATA 11

FIGURE 3 STUDENT ENGAGEMENT BY SCHOOL SECTOR AND GENDER 15

FIGURE 4 STUDENT ENGAGEMENT BY SCHOOL TYPE AND GENDER 15

FIGURE 5 STUDENT ENGAGEMENT BY ACHIEVEMENT AND GENDER 16

FIGURE 6 RESIDUALS OF SCHOOL-LEVEL *ENGAGEMENT* SCORES, RANKED FOR 296 SCHOOLS, SHOWING 'ERROR BARS' FOR 95% CONFIDENCE INTERVALS 21

EXECUTIVE SUMMARY

This report examines the engagement of young people with school. Engagement is an important outcome of schooling, and there are a number of ways in which it can be defined. In this report, engagement is defined through Finn's (1989) taxonomy of engagement or participatory behaviours, which examines students' level of participation in the extracurricular activities offered to them by their schools. Finn (1989) argued that with such participation comes identification with school, a 'belonging' that can help to promote a feeling of self-worth and assist students to become resilient learners, particularly if they are part of a group at risk of leaving school before completing Year 12. Participation in extracurricular activities has been described as providing all students with an educational safety net, and several US studies have found participation to be positively related to a range of positive educational outcomes. In a British study utilising a large national database of student and parent attitudes to school, Barber (1996) found that students' enthusiasm for extracurricular activities was seen by them as a particularly positive aspect of the school experience, and that parents strongly endorsed their value. An enduring effect of extracurricular participation has been shown to be the greater likelihood of participating in voluntary social activities as young adults (Lindsay, 1984).

The study is based on students who were in Year 10 in 1999 using data from the 1998 cohort of the Longitudinal Surveys of Australian Youth (LSAY) project to investigate school-level differences in levels of engagement. It makes use of the full range of data for this particular cohort, analysing data from student, teacher and school-level questionnaires.

The relationships between engagement and student and school-level factors

The first analytical part of the report examines the relationship between a students' sense of engagement and a variety of demographic, socioeconomic, educational and psychological factors, both at the individual level and at the school level. The major findings were:

- Females had higher engagement levels than males. This was apparent in all school sectors and at all achievement levels;
- Students from higher socioeconomic backgrounds and those with professional parents had the highest levels of engagement with school;
- Students from independent schools had higher levels of engagement than those in Catholic schools, who in turn were more engaged than those in government schools;
- Students who plan on enrolling in tertiary study were more highly engaged than those who planned to leave school and go to work;
- Students at single-sex schools were more highly engaged than those at co-educational schools;
- Levels of engagement were found to be higher where students believed that their school had a good school climate, that is one where they have high quality teachers, effective discipline, high levels of student learning and a positive school spirit;
- Students who were generally happy with school and with learning (as measured by the positive affect scale) were more engaged than those who were not; and
- Students who were intrinsically motivated (e.g. I find school work interesting, I like to do my best) were found to be more engaged than those who were not so intrinsically motivated.

School and individual effects on engagement

The second analytical part of the report examines whether there are significant between-schools differences in engagement and second, after finding that there are, which particular student and school characteristics lift engagement, taking into account differences in the academic and social mix of students across schools. This was carried out by fitting a series of multilevel models, with students at the first level and schools at the second level. Multilevel modelling (or multilevel regression) disaggregates the relationships between engagement and its predictors into a within-school and a between-school component, which allows us to examine the effects that schools have on engagement levels. For example, a student from a low socioeconomic background might be predicted to be less engaged than a student from a high socioeconomic background who attended the same school. However some other school might be so effective at promoting engagement that a low socioeconomic background student would have a higher predicted level of engagement than the high socioeconomic status student in the first school.

This report uses an aggregated measure of student engagement, referred to as *school-level engagement*, as a predictor in the multilevel modelling. While this variable was derived from the student-level engagement measure, at the school-level, it becomes a proxy, contextual measure of a school's normative environment. This variable represents, as best we are able to measure it with these data, a school 'ethos' of participation. It is an average for a school, and as such, there are deviations from the mean that would provide a starting point for further qualitative research studies.

The major findings from the multivariate, multilevel investigation of the role of schools and the influence of individual-level factors on student engagement are:

- Between-school differences account for almost 9 per cent of the variation in students' engagement levels. While this is not large, it is significant, and indicates that it *does* matter what school a child attends;
- The overall level of student engagement in the school was a strong predictor of student-level engagement. High engagement at the school level (which measures the effect of engagement over and above that at the personal level) was found to moderate the negative effects of socioeconomic status and indigenous status. This finding indicates that the school environment has an important influence on student engagement;
- Gender, parents' educational level, student perceptions of school climate, self-concept of ability and intrinsic motivation were all found to have an effect on individual engagement, over and above the influence of whole-school engagement. The effect of gender, in that females were much more highly engaged than males, was next strongest to the influence for whole-school engagement, while the other influences were much weaker; and
- Different predictors were found when the analysis was conducted separately for males and females. Apart from whole-school engagement, which was the strongest predictor for both males and females, the analysis found that parents' educational level and student perceptions of school and class climate were the strongest predictors for males. For females, the strongest predictors were found to be socioeconomic status, self-concept of ability, perceptions of school (but not class) climate, and attendance at a coeducational school.

These findings are important firstly from a policy perspective. Student engagement through participation in extracurricular activities is able to be influenced by school administrations through policies on the provision of extracurricular activities and explicit encouragement (or even an *expectation*) of student participation in such activities.

Secondly, the findings are important because they isolate several differences in factors affecting the engagement of males and females that can be influenced by schools. For males, attention in schools needs to be paid to classroom and school climate. Males appear to need more of a supportive school and classroom environment to be engaged with their school. They need to be strongly encouraged by their schools and by their parents to participate in extracurricular activities, and a broader range of activities developed by schools that are appealing to young males.

For females, schools need to focus on developing a strong self-concept of ability and positive views of school climate. Whilst for males, parents' educational level, and for females, socioeconomic status, are not malleable, their effects are small compared to the effects of overall high levels of school engagement.

This report finds that it *does* matter which school a student attends. Students at schools which have the resources or the commitment to provide a broad range of extracurricular activities and encourage students to participate, generally have higher levels of engagement than those in schools which do not. Strong participation in such activities leads to a student's closer connectedness to the school community, and it is argued in the report that there are 'flow-on' effects to more academic parts of the curriculum. As an equity issue, it is important that this be addressed. Socioeconomic status is a persistent influence on participation, both at the individual level and at the school level. At present, students with parents who have the financial resources to allow a wide participation in extracurricular activities obtain a benefit from schooling that those students with less access to financial resources do not.

Student engagement with school: Individual and school-level influences

1. INTRODUCTION

Student engagement with the intellectual work of schools is a primary goal of education, however taking achievement as the *only* outcome of 13 years of education is a narrow focus, and there is strong evidence that the Australian school community has a much broader view of the central purpose of schools. For example McGaw, Piper, Banks and Evans (1992) reported that Australian school communities expressed a belief that one of the key outcomes of schooling was the development of students' personal and social skills, as well as positive self-concept, self-discipline and self-worth. Extracurricular activities may provide an opportunity for students to develop these skills in a less formal setting than the classroom. As well, students who develop positive relationships with school, through the classroom or through participation in extracurricular activities, are more likely to become lifelong learners, moving in and out of education and training as they find it necessary. In the short term, they are more likely to remain at school to complete Year 12, whatever their achievement level (Holland & Andre, 1987; Mahoney & Cairns, 1997; Marks, Fleming, Long, & McMillan, 2000). To understand how to assist students to develop this connectedness to school, research needs to focus not just on students' test scores, which puts the focus on *what* is learnt, but on what it takes to develop the learner. This particular piece of research examines the influences on students' participation in extracurricular activities.

Across Australia, students have the opportunity to participate in an array of extracurricular activities organised by their schools. These include sports programs, community programs, school governance, music, art and drama, academic and vocational clubs as well as programs such as peer mediation and peer support. These extracurricular activities are recognised widely by teachers and parents as providing students with opportunities for leadership, for personal growth and for developing a sense of commitment to the well being of the wider community. They offer students opportunities to apply skills learned in the classroom in an applied setting, for them to learn the value of teamwork, competition and cooperation, individual and group responsibility.

This study draws on Finn's (1989) identification of participatory behaviours as a measure of students' engagement with school. Finn (1989) argued that young people's level of autonomy and their opportunity for participation in extracurricular activities increases with age, and that many students participate in such activities both in addition to, and sometimes instead of, the formal curriculum. Participation in such activities promotes a sense of engagement with school, and the current report examines the extent to which this form of engagement is influenced by a student's personal characteristics, or by the school that they attend.

Most of the research on school effectiveness has focused on outcomes in terms of academic achievement; less attention has been paid to how well schools engage students in learning and in school life and how this affects students' outlooks on school and the future. However the purposes of schooling are varied. An academic perspective of schooling focuses on intellectual competence, and emphasises the purpose of schools as transmitters of formal knowledge and the pursuit of academic excellence. In contrast, a developmental perspective emphasises the provision of a variety of experiences to ensure the psychological, social and physical development of all individuals in a school. These perspectives are not contradictory, and schools need to address engagement issues as well as those of achievement. For instance, summarising their report on what makes schools effective, McGaw et al. (1992) concluded that:

> School effectiveness is about a great deal more than maximising academic achievement. Learning and the love of learning; personal development and self-

> esteem; life skills, problem solving and learning how to learn; the development of independent thinkers and well-rounded confident individuals; all rank as highly or more highly as the outcomes of effective schooling as success in a narrow range of academic disciplines. (p. 174)

At Year 9 level for this particular cohort, around 80 per cent of students are certain that they want to remain at school until Year 12. While this aspiration may ebb and flow somewhat over the next three years of their schooling, the apparent annual retention rate to Year 12 nationally remains only at about 72 per cent (Australian Bureau of Statistics, 2001). In many cases students leave against the express advice of their parents and teachers, and one of the major reasons that they leave is because of disengagement with school and with learning. It is likely that some groups of students are more engaged than others, and that some schools are more effective than others at engaging students. This report examines some of the contributing factors to these differences.

Defining and measuring *Engagement*

There are a number of facets to students' engagement with school. One is engagement with learning, another is engagement with the school community. While this study only examines the latter, it is likely that there is a synergistic relationship between the two facets. The study draws on Finn's (1989) identification of participatory behaviours as a measure of students' engagement with school. While Finn's taxonomy comprises four levels, it is the third level only that is examined in this study. Finn's third level of engagement is defined as "participation in the social, extracurricular, and athletic aspects of school life in addition to or in place of extensive participation in academic work" (Finn & Rock, 1997, p. 222).

Finn (1989) argued that students who regularly participate in extracurricular activities develop a sense of 'belonging' to their school community, in that they are a conspicuous part of the school and that the school is an important part of their own lives. This 'belonging' can help to promote a feeling of self-worth and assist students to become resilient learners, particularly if they are part of an "at-risk" group in terms of school completion (Mahoney & Cairns, 1997) and other educational outcomes. Mahoney and Cairns (1997) found not only that engagement in extracurricular activities was linked to decreasing dropout rates, but that this outcome was strongest for those students who were at highest risk of dropping out. They hypothesised that for those students with marginal attachment to school and its values, participation in extracurricular activities "provides an opportunity to create a positive and voluntary connection to the educational institution … unlike alternative procedures which focus on the deficits of students" (p. 248).

While there are few studies examining the relationship of participation in extracurricular activities with academic achievement in school, Holland and Andre's (1987) review of research in this area concluded that participation is correlated with a number of desirable outcomes, including higher levels of self-esteem and feelings of control over one's life, higher educational aspirations and higher grades, especially among males.

> Participation has effects because of what happens as a result of participation … Participation may lead students to acquire new skills (organizational, planning, time-management etc.), to develop or strengthen particular attitudes (discipline, motivation), or to receive social rewards that influence personality characteristics. (Holland & Andre, 1987, p. 447)

Using *High School and Beyond* longitudinal data, Camp (1990) examined the effects of extent of participation in extracurricular activities on student achievement, controlling for the effects of other variables such as socioeconomic status and prior academic achievement, using structural covariance analysis. His study found that students' participation levels produced a significant

positive effect on achievement, an effect found to be more than twice the size of student study habits.

Marsh's (1992) analysis of the same database, focussing on the effects of the amount of extracurricular participation, found that the significant effects of total extracurricular activity participation were small but consistently positive. Marsh (1992) found that the total amount of activity typically facilitated academic outcomes rather than detracted from them, and that these positive effects were generalisable across a variety of student backgrounds. He concluded that "participation in extracurricular activities – even those not obviously associated with academic achievement – apparently leads to increased commitment to school and school values, which leads indirectly to increased academic success" (p. 560). Gerber's (1996) examination of the relationship between extracurricular participation and academic achievement using *National Educational Longitudinal Study* (NELS) data similarly found a positive relationship between participation levels and academic achievement, and the author argued that participation "may be one important source of identification with school, especially for academically weak students and those who are at-risk for withdrawing" (p. 50).

In a UK study, Barber (1997) examined a small number of schools cited by OFSTED (Office For Standards in Education) as being worthy of special recognition in the annual report of the Chief Inspector, comparing extracurricular provision to those in a similar number of non-cited schools. While the results of such an examination cannot be generalised, it was found that extracurricular provision and levels of participation in extracurricular activities was much higher in these exemplar schools. Barber (1996) also provides evidence from the Keele University national database on student and parent attitudes to secondary school that students are enthusiastic about extracurricular participation and that parents see it as an important aspect of schooling.

An enduring benefit of extracurricular participation was found to be higher participation rates in voluntary social activities as a young adult (Lindsay, 1984). This study used a large national longitudinal database in the US to examine the effects of extracurricular participation on both educational attainment and on social participation as a young adult, accounting for the effects of prior academic attainment, gender, socioeconomic status, and sociability. The author found that extracurricular participation did indeed affect participation, controlling for all other variables, and that this effect was a somewhat more powerful influence than educational attainment.

There are a number of other benefits of students' engagement with school. For example, young people who have positive feelings towards school and who are active participants in a variety of school activities are more likely to stay in school and are more likely to become independent learners (Ainley, Batten, & Miller, 1984; Ainley, Foreman, & Sheret, 1991; Ainley & Sheret, 1992; McNeal, 1995). Other studies have found positive relationships between a student's engagement and academic achievement and with other educational outcomes, including better attendance and aspirations to higher levels of education (Connell, Spencer, & Aber, 1994; Finn & Rock, 1997; Marsh, 1992; National Centre for Education Statistics, 1995), while dissatisfaction with aspects of school life has been demonstrated to be a key issue for non-completion of secondary school (Batten & Russell, 1995; Holden & Dwyer, 1992).

In more recent analyses of the LSAY data, Marks, Fleming, Long and McMillan (2000) found that a variety of factors, such as level of engagement in school life (measured by participation in extracurricular activities), academic self-concept, educational aspirations and parental expectations were significant influences on Year 12 participation. Lamb, Dwyer and Wyn (2000) cited negative experiences of schooling or poor academic self-concept as reasons given by many students for not completing school.

It is clear from the research that engagement is an important construct, both in terms of its effect on a variety of other educational outcomes and because it is a valuable outcome in itself.

However Finn's (1993) taxonomy of engagement is largely a function of the individual, and it is difficult to find studies that have attempted to link characteristics of schools that reach beyond the classroom with student's engagement. The model analysed in this report includes school-level influences such as the organisational environments in which these students are situated.

Key Questions

A number of key questions were developed to guide the data analysis.

- What is the influence of socioeconomic background on student's engagement levels?
- What is the influence of gender on student's engagement levels?
- To what extent can differences in student engagement be attributed to differences between schools? (The variation between schools in student engagement is an indication of the influence of individual schools. If the between-school variance is large, then it is clearly important which school a student attends. If the between-school variation is small then the school a student attends makes little difference to their engagement.)
- What are the characteristics of students or schools that enhance a student's engagement with school?

Organisation of the report

This report comprises five chapters. Chapter 2 of this report will examine the variables and methods used in this report, including a brief account of multilevel modelling and its particular use in this study.

Chapter 3 provides a univariate analysis of the student-level and school-level variables that are included in the theoretical model proposed, as well as their relationship with the outcome variable, student engagement.

Chapter 4 investigates the influence of schools and school characteristics on student engagement with multilevel analysis, adjusting for differences in the home background of the student.

Chapter 5 discusses the results of the study and policy implications of the findings.

2. DATA AND METHODS OF ANALYSIS

This chapter provides the reader with information to facilitate their understanding of the results presented in tables and discussed in the text of the following chapters. The initial section provides a description of the LSAY data used in the report.

Data

In 1998, a nationally representative sample of 14,118 Year 9 students was selected to form the second cohort of the new program of the *Longitudinal Surveys of Australian Youth*. The initial sample was constructed by randomly selecting two to three Year 9 classes from a sample of schools designed to represent State and sector. Smaller States and Territories were over-sampled to provide sufficient numbers to provide reliable State estimates on a number of key variables. This sample, termed the Y98 cohort, was surveyed again in 1999, this time with a mail survey. Attrition for this survey resulted in there being 11,150 cases available for analysis. More details about the sample can be found in Appendix 1.

Early in 1999, two questionnaires were sent to the participating schools. One of these was a *School Questionnaire*, which was completed by the Principal or a representative; the other was a *Teacher Questionnaire*, which was completed by a sample of ten Year 10 teachers. The school questionnaire collected information on school programs, school organisation and timetables. The teacher survey included questions on aspects of teaching and learning, as well as teachers' levels of satisfaction with a variety of aspects of schooling. Because of the limitations of the sampling techniques (in that these teachers were not necessarily those of the students surveyed), the teacher data was averaged to school-level, to provide variables at the school level that would represent an overall view of a number of facets of school climate, environment or ethos. Personal characteristics of teachers such as gender, experience teaching, and qualifications could not be used in this analysis, as they could not be meaningfully averaged to school-level.

Data were obtained from 1,716 teachers and from 218 schools of the 300 schools in the initial sample. Not all of the schools that provided a *School Questionnaire* also provided *Teacher Questionnaires* and vice versa.

Construct measurement

Most theories and models in educational research are formulated in terms of hypothetical constructs or latent traits that are not directly measurable. In survey research, it is usual to compute complex composite variables from responses to several questionnaire items measured on dichotomous or Likert-type ordinal scales. For this report, items were first selected to form composite variables *a priori*, based on substantive grounds. Exploratory factor analysis was then used to confirm the single factor structure of each set of items.

The resultant composite measure has been traditionally computed either as a sum of factor scores or as simple, unit-weighted additive indices of their indicators, regardless of either the measurement or distributional properties of the constituent variables or of their relative contribution to the composite scale. These indices are then usually treated as continuous variables for the purposes of general linear model techniques, which assume that there is no measurement error associated with these indices.

However Rowe (2000) warned that this approach ignores the possibility that some factors may contribute more than others to a scale and that the resulting composite scale may be invalidated if one or more of the indicator variables measure a latent trait other than the one under consideration.

The composite variables used in this report were constructed to take into account the different weights of the constituent items and measurement error. The method used was confirmatory factor analysis (CFA) using LISREL 8.3 (Jöreskog & Sörbom, 1999) under a weighted least squares method of estimation and a listwise deletion of missing data. These composite variables were obtained by fitting one-factor congeneric models to the ordinal-scaled item data, based on a scaled covariance matrix of the polychoric (ordinal with ordinal) correlations using PRELIS 2 (Jöreskog & Sörbom, 1999). It is argued that the use of structurally sound and reliable composite scores is crucial in fitting multilevel regression models (Bryk & Raudenbush, 1992; Goldstein, 1995; Rowe, 2000). Unlike traditional unit-weighted methods for computing composites, the use of factor score regression weights obtained from one-factor CFA models minimises measurement error in the items contributing to each scale, thus increasing the reliability (and validity) of the computed scale scores. The factor score regression coefficients for all constructed scales are provided in Appendix 3.

Defining and measuring *Engagement*

As was discussed earlier, *Engagement* in the LSAY data is defined in terms of extracurricular participation. Several items were framed for the questionnaire administered to students when they were in Year 10 to identify this level of participation. The item is headed "Extra activities organised by school", and to ensure that students identify extracurricular activities rather than those which are provided as part of the curriculum, the explanation continues:

"*As well as the subjects they teach, schools organise many different out-of-class activities for students. How often do you take part in the following school-organised activities?*"

- *Sport*
- *Music, band or orchestra*
- *Debating*
- *Drama, theatre, dance or school play*
- *Community and support work at school (eg peer support, fundraising).*

Resposes to these items were re-coded from the original to a five-point scale with 0 representing no participation in the activity through to 4 representing participation in the activity on at least a weekly basis. The one-factor model is illustrated diagrammatically in Figure 1, which shows the latent variable *Engagement* on the right and the measured variables in rectangles on the left.

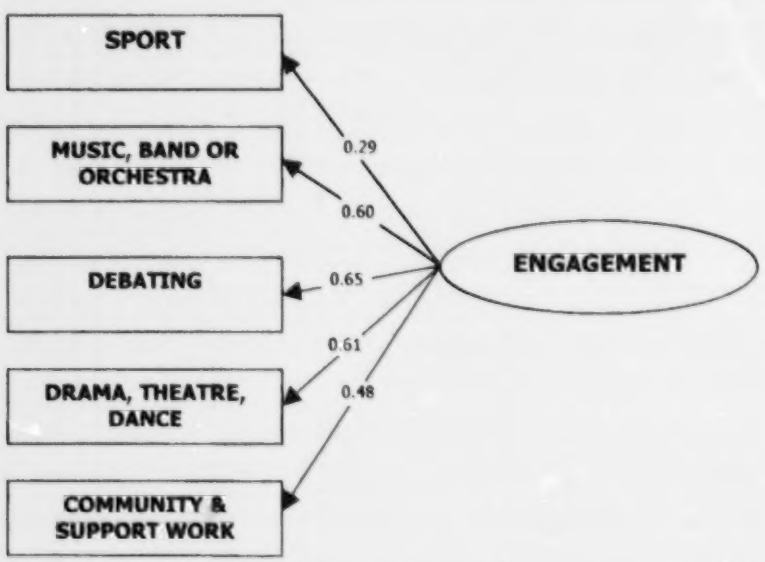

Figure 1 One factor congeneric measurement model for *Engagement*

Goodness-of-fit statistics indicate that this model is a good fit to the data. The Root Mean Square Error of Approximation (RMSEA) was .0433[1], while the Adjusted Goodness of Fit Index (AGFI) was .994, indicating that the five factors accounted for around 99 per cent of the variance in *Engagement*. If we were developing the items and trialing them we might re-consider the use of the items relating to participation in sport and in community and support work, as these items add little to the model. In this case however, it is more expedient to use all of the data that we have available, and to weight the items proportionally by their actual contribution to the scale.

Other constructed variables

The techniques described in the previous section were used in the construction of each composite variable that was used in this report. At the student level, variables were constructed representing students' views of their classroom and school climate. The Teacher questionnaire has not been used in any previous LSAY reports. Factors were identified *a priori*, and exploratory factor analyses supported the hypothesised groupings. Confirmatory factor analysis was then carried out to derive the appropriate weights for each item on the scale. All of the factor score regression weights that were used are detailed in Table A1 in Appendix 3. The composite variables that were used are detailed in Appendix 4.

All variables used in multilevel modelling were normalised so that they were directly comparable in size.

Influences on engagement

Figure 2 provides a framework for this investigation. While many factors can be hypothesised to influence student engagement as measured in this report, including school ethos, peer group, student background and student inclination, the analysis in this report is limited to the data available from the LSAY surveys. This section of the report presents a brief description of all measures used, other than those which are obvious, such as gender, school sector, and indigenous status. For a more detailed description of all factors the reader is referred to Appendices 2 and 4.

Student-level variables

Socioeconomic status was based on the male parent's occupation and coded on the ANU3 scale of occupational prestige.

Parent's educational level was constructed from the highest level of education of the female parent.

Home language was based on the primary language spoken at home.

Parents' country of birth was based on the male parent's country of birth.

The *students' aspirations* measure was based on student's post-school educational plans.

Achievement was based on students' scores on literacy and numeracy tests completed when the students were in Year 9.

Perceived class climate was a scale on which students were asked the extent to which students in their classes were eager to learn, made good progress, work hard and were well behaved.

Perceived school climate was a scale on which students were asked the extent to which to rate their school on quality of teachers, effective discipline, student learning and school spirit.

Self-concept of ability measured students' perceptions of their ability in English, mathematics and overall.

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[1] The Root Mean Square Error of Approximation (RMSEA) allows us to calculate the probability of obtaining the same results if a similar sample was taken from the 'super population'. In this case the probability would be (100 – 4.33) ~ 96%.

Quality of School Life – Positive Affect based on students' perceptions of their own well-being.

Quality of School Life –Intrinsic motivation was constructed from seven items which address student's self-motivation in learning.

Quality of School Life –Opportunity measured student's belief in the relevance of learning.

Quality of School Life –Achievement measured student's sense of success in school work.

School-level variables

Classroom climate was a scale on which teachers were asked the extent to which students in their classes were eager to learn, made good progress, work hard and were well behaved.

School climate was a scale on which teachers were asked the extent to which students in their school were eager to learn, made good progress, work hard and were well behaved.

School problems assessed the frequency of occurrence of problems such as student absenteeism, vandalism, verbal abuse of teachers and poor student behaviour in the school.

Parental involvement asked teachers to rate the perceived level of parental involvement with school decision making, camps and excursions, parent-teacher evenings and general support of the school's goals.

Satisfaction with workload measured teachers' level of satisfaction with their workload, out-of-class duties, amount of committee work and class sizes.

Satisfaction with resources measured teachers' level of satisfaction with access to teaching resources, buildings and facilities, teaching equipment and grounds and sports facilities.

Satisfaction with management measured teachers' level of satisfaction with support from and style of management, and decision making processes.

Relationships with others assessed the strength of relationships between teachers, between teachers and students and between teachers and parents.

Academic success measured teachers' perceptions of the level of success in their school in promoting academic success, such as in achieving good academic results, preparing students for higher education, and providing a broad range of co-curricular activities.

Broad success measured teachers' perceptions of the level of success in their school in promoting broad success, such as in providing a curriculum that caters for all students, teaching skills useful in employment and meeting the needs of disadvantaged groups.

Rating teachers asked teachers to rate their colleagues, for example on mastery of their subject matter, communication, maintaining interest and managing discipline.

Gender mix of school refers to whether the student attended a single-sex or coeducational school.

Size of school is a continuous measure that refers to the number of students enrolled at the school.

Student background and contextual factors including gender, socioeconomic status, indigenous status, language at home, aspirations and parents' education, were hypothesised to affect a student's level of engagement with school. A group of student-level attitudinal and achievement factors were also hypothesised to impact on student engagement with school. These included students' self-concept of ability, level of achievement, beliefs about the quality of school life and perceptions of classroom and school climate. These factors are also influenced by social background, however this influence is not measured in this report.

At the second level of the model are a range of teacher and school-level variables, which were hypothesised to have an independent effect on student-level engagement. Measured directly at the school level were factors such as school sector, gender-mix of school and school size. School size was included as a school-level variable as it has been shown to affect engagement with schooling (Lee & Smith, 1995, 1997). A measure of school-level engagement was also added at this level, and while this variable was derived from the student-level engagement measure, at the

school-level, engagement becomes a proxy, contextual measure of a school's normative environment. Clearly, the average engagement of students within a given school (and its variance) may have an effect on students above and beyond the effect of an individual's engagement. Outliers can affect a school-level average, and if, for educational policy reasons, we are interested in improving educational outcomes for students, then the use of such an average in this model allows us to identify those students who do not fit the pattern. That is, students with low levels of engagement in schools with high levels of engagement, and student with high levels of engagement in schools with low levels.

A number of variables derived from the teacher questionnaire were aggregated to school-level. Teachers are a socially diverse group; they come from differing ethnic and socioeconomic backgrounds and have differing work histories and academic credentials. It is reasonable to assume that this varied background creates diversity in the expectations and manner in which teachers experience the school, thus producing differing perceptions of the climate of the schools in which they work. By aggregating the teacher data to school level we create a proxy measure of overall school climate.

The effects of these variables were examined using multilevel modelling techniques to account for the hierarchical structure of the data, that is students within schools. Failure to take into account this structure makes data analysis seriously prone to underestimation of standard errors and therefore erroneous conclusions.

Multilevel modelling

By its very nature, the investigation of school effects using the LSAY data requires the exploration of multilevel relationships. For LSAY, schools are first sampled and within these schools, students within classrooms are sampled, and as a result of this method of sampling, the individual observations within schools are not independent. This dependence arises because of the shared experiences among students and/or teachers within a given school, and is due in part to the way in which persons are assigned to schools. For example, because samples of students or teachers within particular schools are, in general, more like each other than similar sampling units in other schools, to the extent that schools vary in their effects, the responses of students or teachers within a given school will be correlated. Further, since the distribution of student or teacher outcomes may vary as a function of school-level explanatory variables, these variables are parameterized by their partial regression coefficients within each school (see Burstein, Miller & Linn, 1981; Goldstein, 1987, 1995). This is due to the fact that the school-level variables are constant for students and/or teachers.

As a result, the average correlation between variables measured on students from the same school will generally be higher than the average correlation between variables measured on students from different schools. Standard statistical tests rely on the assumption of independence of observations, and this assumption is generally violated in multilevel data, resulting in a spurious number of 'significant' results. Due to this, the means presented in Chapter 3 are not tested for significant differences, as the assumption of a simple random sample is violated and standard errors would be underestimated.

Multilevel modelling (MLM) techniques are used to account for the inherent multilevel structure of the data. These techniques are essentially an extension of linear regression models, and assume that there is a single dependent variable measured at the lowest level and explanatory variables at all existing levels. In this study we utilise a two-level model, placing the student at the first level and the school at the second level. For further information related to this, the reader is directed to publications such as Bryk and Raudenbush (1992), Goldstein (1995), Kreft and de Leeuw (1998) and Snijders and Bosker(1999).

Before fitting the multilevel models, however, it is important to examine the distributional properties of the continuous variables to be used in subsequent explanatory modelling. For such purposes, PRELIS 2 (Jöreskog & Sörbom, 1999) gives a detailed summary of the descriptive parameters and provides both univariate and multivariate tests of zero skewness and zero kurtosis[2]. The raw 'composite' scale scores were normalised using MLwiN (Rasbash, Browne, Healy, Cameron, & Charlton, 2000) for the multilevel analysis, as screening tests found significant levels of multivariate skewness and kurtosis. MLwiN (Rasbash et al., 2000) uses a method of re-scoring that assigns expected values from the standard Normal distribution according to the ranks of the original scores in the form of Normal Equivalent Deviates.

Graphical techniques

Boxplots

Boxplots are used to graphically illustrate the distributions of engagement scores in the sample, both within and across sociodemographic and educational groups. The horizontal line near the middle of a box represents the median value; that is, 50 per cent of the cases have engagement scores above this value and 50 per cent of the cases have engagement scores below this value. The top of the box represents the 25th percentile; that is, 25 per cent of cases have scores above this value. Similarly, the bottom of the box represents the 75th percentile, above which lie the scores of 75 per cent of students. The distance between the top and the bottom of the box is referred to as the inter-quartile range, which can be used as a summary measure of the 'spread' of engagement scores. The 'whiskers' above and below the box represent the 10th and 90th percentiles: 10 per cent of cases have values above the 10th percentile; and 90 per cent of cases have values above the 90th percentile.

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[2] Skewness is a measure of symmetry, or more precisely, the lack of symmetry. A data set is symmetric if it looks the same to the left and right of the centre point. A skewed data set has many more values at one end than the other. Kurtosis is a measure of whether the data are peaked or flat relative to a normal distribution. That is, data sets with high kurtosis tend to have a distinct peak near the mean, decline rather rapidly, and have heavy tails. Data sets with low kurtosis tend to have a flat top near the mean rather than a sharp peak.

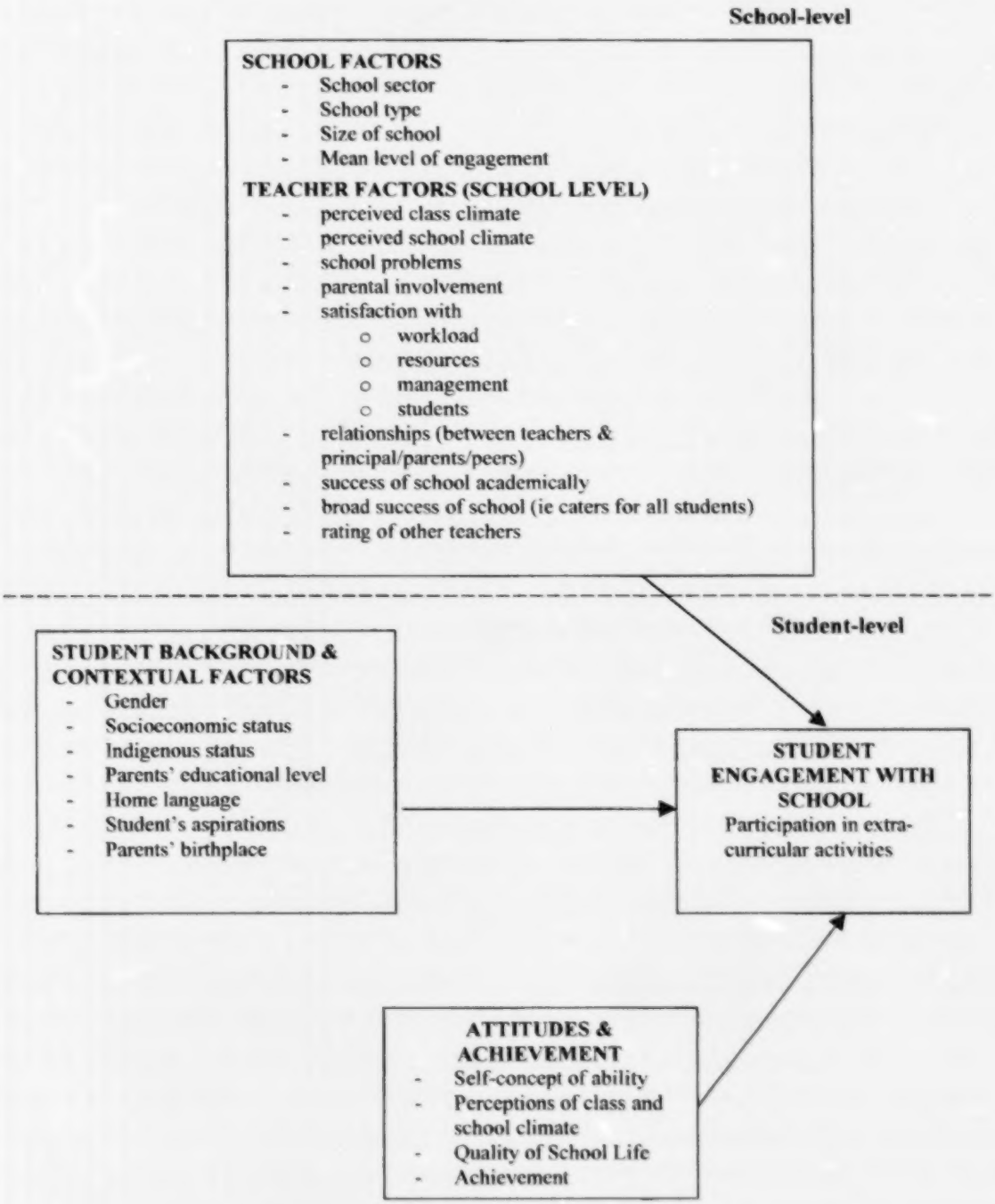

Figure 2 Model proposed for explaining student engagement using LSAY data

3. STUDENT AND SCHOOL FACTORS AND THEIR RELATIONSHIP WITH ENGAGEMENT

This chapter examines a variety of student-level and school-level factors that are hypothesised to influence engagement with schooling. The findings in this chapter are indicative only – no account is taken of the interrelationships between variables.

Table 1 provides the means for engagement for each of the categorical student background variables identified: gender, indigenous status, achievement in literacy and numeracy, parents' educational background, language background, school sector and type and student's aspirations. Also provided is the proportion of students in each group who participated in each of the activities on a monthly or weekly basis.

Table 1 Means on *Engagement* measure and percentage of students participating at least once a month, by student background factors

		Engagement		Percentage of students participating at least once a month				
	N*	Mean	SD	Sport	Music	Debating	Drama	Community
Gender								
Male	4122	1.16	.78	72	15	7	11	19
Female	4274	1.41	.82	62	19	8	24	28
Indigenous status								
Indigenous student	186	1.30	.78	77	12	10	17	25
Non-indigenous student	7905	1.28	.81	67	17	7	18	24
Parents' educational level								
University	1731	1.47	.87	72	26	12	20	29
TAFE	1057	1.36	.82	71	16	8	21	25
Apprenticeship	425	1.25	.79	63	15	6	17	21
Completed secondary school	2015	1.25	.79	67	17	6	17	23
Did not complete secondary school	2636	1.18	.76	62	13	6	16	21
Home language								
English	7276	1.27	.81	66	15	7	18	23
Non-English	739	1.33	.80	69	18	11	16	26
Parent's country of birth								
Australian	5575	1.27	.81	67	17	7	17	23
Other English-speaking country	939	1.28	.82	63	19	6	19	23
Non-English speaking country	1581	1.33	.80	67	17	10	16	27
Student's aspirations								
No post-school study	1108	1.05	.74	64	10	5	12	15
Apprenticeship	644	1.10	.72	70	10	4	13	18
Other or TAFE	1536	1.22	.76	66	13	5	17	22
University	4285	1.40	.84	68	22	10	20	28
School Sector								
Government	5549	1.20	.79	63	15	6	17	20
Catholic	1748	1.38	.80	73	17	11	18	31
Independent	1131	1.55	.85	77	31	10	19	28
School type								
Coeducational	4639	1.25	.81	65	17	6	18	22
Single-sex	1217	1.51	.84	77	24	14	18	32
Early school achievement								
Highest	2188	1.39	.85	69	24	10	16	25
Upper middle	2123	1.31	.82	66	19	7	20	25
Lower middle	2097	1.22	.77	65	13	7	17	22
Lowest	1987	1.21	.78	68	13	6	18	21

* Note: Ns sum differently due to varying student response rate

Gender

The means shown in Table 1 indicate that there are a number of gender differences in engagement levels, and that overall engagement levels are higher for females than males. In the context of this study, this means that female students are likely to participate to a greater extent in extracurricular activities than males, thereby increasing their level of attachment to the school. This finding is consistent with other research (Finn, 1989; Finn & Cox, 1992; Lee, Chen, & Smerdon, 1996; Lee & Smith, 1993, 1995). Males are more likely to participate in sports activities (which added little to the engagement model as shown in Figure 1), whereas females' level of engagement is greatly enhanced by the much higher proportion who participate on a regular basis in drama and community work.

Indigenous status

While it would appear from these data that there is little difference in the level of engagement shown and by the participation levels in the activities by indigenous and non-indigenous students, some caution is required due to the low number of indigenous youth in the sample.

Parents' educational level

There appears to be a positive linear relationship between engagement and parents' educational level. Children of tertiary educated parents have higher levels of engagement than those whose parents attended a TAFE, and the lowest levels of engagement are seen for those young people whose parents did not complete secondary school. The differences are seen the most in the proportion of students who participate regularly in music and sport, while there are few differences in drama participation levels.

Home language and parents' country of birth

These two variables examine differences in level of engagement by ethnicity, however the differences between groups are quite small. In both cases there is a tendency for those with a language background other than English to have higher levels of engagement than those from an English-speaking background or with parents born in Australia. The participation rates show that the children of parents from non-English speaking countries are more likely to participate in community support activities.

Student's aspirations

Student's aspirations should be associated with student engagement. It stands to reason that students who aim to complete secondary school and continue their education into the post-secondary sector would be more likely to be involved with their schooling and more likely to participate in extracurricular activities. Table 1 indicates that this is indeed the case, with levels of engagement being highest amongst those students who aim to continue their education and lowest levels amongst those who have no plans for post-school study. These students are a great deal more likely to participate in music, debating, drama and community work, with the differences being smallest in sport participation.

School sector and school gender mix

It would be hypothesised that students in the non-government school sector (encompassing both Catholic schools and non-Catholic independent schools) would have higher levels of engagement than those in the government school sector. In general, there is a much greater provision of extracurricular activities in the independent school sector, and in many schools it is compulsory for students (and indeed teachers) to participate. Those parents with students in the independent school sector are also more likely to have the financial resources to provide for their child to participate in a wide range of extracurricular activities.

These data demonstrate that students attending non-Catholic independent schools show higher levels of engagement than those in Catholic secondary schools, who in turn have higher levels of engagement than those in government schools. Similarly, students at single-sex schools have higher levels of engagement than those in coeducational schools. Participation in music is particularly high in independent schools, with almost one-third of students involved in music on a monthly or weekly basis, compared to one-sixth of students in government schools. Participation rates in drama activities are very similar in each school sector, and the same between coeducational and single-sex settings.

It must be recognised, however, that there is likely to be confounding of these variables, in particular with parents' education and socioeconomic status. Students from high socioeconomic backgrounds are more likely to be those with parents who have high levels of education, and are more likely to attend non-Catholic independent schools. As well, single-sex schools are more common in the Catholic and independent sectors. It is also more common for students in the non-government sector to be required to participate in extracurricular activities. It is very important that we examine differences in engagement, therefore, controlling for these background variables.

Achievement level

The mean levels of engagement as presented in Table 1 indicate that there are some differences in engagement according to achievement level. Engagement is higher among students with higher achievement levels. This concurs with previous findings that more academically successful students show higher levels of engagement with school (Lee & Smith, 1993, 1994). This is most likely to be due to the much greater involvement in music activities, with around one-quarter of students from the highest achievement level participating in music compared with one in eight of those from the lowest achievement level.

Socioeconomic status

As socioeconomic status in this report is measured with the ANU3 occupational prestige scale, which is continuous, the analysis performed for the categorical variables is not appropriate; hence correlational analysis is presented in this section. The correlation of student engagement with socioeconomic status was found to be 0.11, which is small, but significant at the 10% level. As found for parents' educational level, there is a positive linear relationship: students from higher socioeconomic levels show higher levels of engagement.

In the next section of this report, some analyses will be reported that examine the extent to which several of the background factors might interact with gender in their influence on engagement. While there are many such possible combinations of interactions, gender was chosen specifically for the focus of this particular analysis. As has been previously discussed, gender is an important factor in engagement. A number of studies have reported differences in levels of engagement between males and females, in favour of females, and it is mooted that males' alienation from school is becoming a major problem for the community.

Interactions amongst background factors

The previous section showed that school sector is associated with engagement. However is this association the same for males and females? Figure 3 indicates that while there is a similar association, there are some differences.

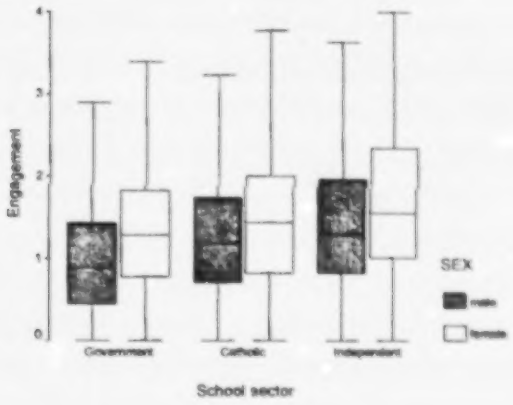

Figure 3 Student engagement by school sector and gender

Although the median score is higher for females than males within each school sector, and by a similar margin, the differences lie in the proportion of each of the distributions that overlap. This is smallest for the government schools, indicating that gender differences are greater within this sector. However the median score for engagement among females at government school is also higher than the median male score in any school system.

Figure 4 shows the distribution of engagement by school type (single-sex or coeducational) and gender. Certainly females are more engaged within each different type of schooling, and females' levels of engagement in coeducational schools are almost identical to the levels of engagement of males in single-sex schools. Gender differences are greater in coeducational schools.

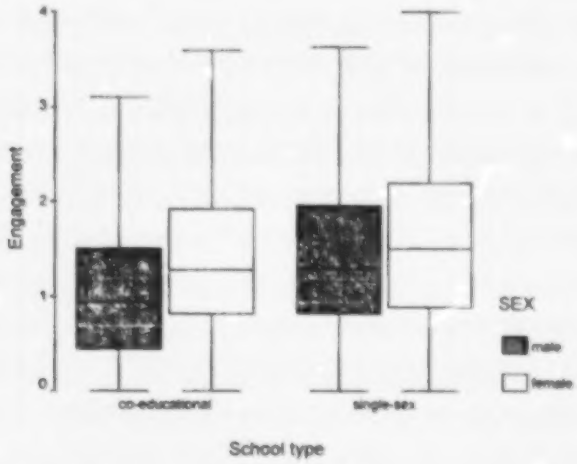

Figure 4 Student engagement by school type and gender

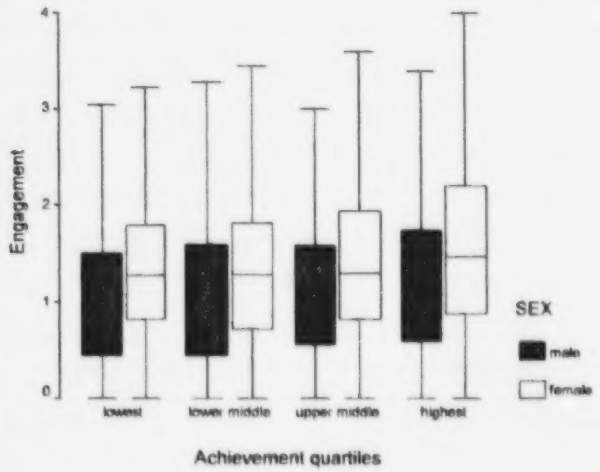

Figure 5 Student engagement by achievement and gender

Figure 5 shows the distribution of engagement by achievement level and gender. At each level, females show higher levels of engagement than males, and while the differences appear to be largest at the highest achievement level these differences are probably not practically significant.

Student attitudinal variables

Table 2 provides the reader with correlations between the attitudinal variables and achievement. These variables were presented in Figure 2 as the second set of variables. It can be seen that there are positive (and significant, due to sample size) correlations with engagement for all of the attitudinal variables, as well as with the continuous measure of achievement. While these correlations are not large, they indicate that an association exists that needs to be included in a model to attempt to explain engagement. The strongest correlations are between engagement and school climate, intrinsic motivation and positive affect. Not surprisingly, those students who see their school as having a positive and supportive environment, who enjoy school and learning, are more engaged, participating more frequently in extracurricular activities.

Table 2 Correlations with engagement for student attitudinal variables and achievement, all students

	Correlation with Engagement
Perception of class climate	.14
Perception of school climate	.21
Self-concept of ability	.16
QSL – Intrinsic motivation	.22
QSL - Opportunity	.13
QSL - Achievement	.15
QSL - Positive Affect	.23
Achievement	.09

Table 3 Correlations with engagement for student attitudinal variables and achievement by gender

	Correlation with Engagement	
	Males	**Females**
Perception of class climate	.13	.12
Perception of school climate	.21	.16
Self-concept of ability	.13	.18
QSL – Intrinsic motivation	.20	.23
QSL - Opportunity	.13	.14
QSL - Achievement	.14	.14
QSL - Positive Affect	.21	.20
Achievement	.06	.09

Table 3 presents the same correlations, separately for males and females. Among the strongest associations with engagement for both males and females are intrinsic motivation and positive affect, however the association with school climate is stronger for males than females, and the association of self-concept of ability with engagement is greater for females than males.

Table 4 presents the correlations by school sector. Higher levels of engagement in independent schools appears to be associated with higher levels of satisfaction on most variables. The strongest associations with engagement for each sector were intrinsic motivation and positive affect, and for those in independent schools perceptions of school climate were also strongly associated with engagement. Most correlations were higher in independent schools.

Table 4 Correlations with engagement for student attitudinal variables and achievement by school sector

	Correlation with Engagement		
	Government	**Catholic**	**Independent**
Perception of class climate	.11	.10	.18
Perception of school climate	.15	.14	.20
Self-concept of ability	.12	.15	.17
QSL – Intrinsic motivation	.20	.19	.24
QSL - Opportunity	.11	.09	.17
QSL - Achievement	.11	.14	.18
QSL - Positive Affect	.21	.16	.20
Achievement	.03	.09	.12

It appears from these analyses that the attitudinal factors most highly correlated with engagement are the *Quality of School Life* scales for Intrinsic motivation and Positive affect. Not surprisingly, students who are generally satisfied with school and themselves, and who find school exciting and stimulating, are most likely to be those with high levels of engagement, participating more fully in extracurricular activities.

Teacher variables

The next section of the analysis provides the correlations with student engagement for the teacher variables and for the school variables. A multilevel average (similar to aggregation to school-level, carried out in MLwiN) was calculated for each of the teacher variables at school-level and this school-level average was then assigned to each student within the school.

Table 5 Correlations with engagement for teacher variables

	Correlation with Engagement
Classroom climate	.07
School climate	.07
Problems with the school	.07
Parental involvement	.08
Satisfaction resources	.08
Satisfaction workload	.07
Satisfaction management	.06
Satisfaction students	.07
Relationships with others	.08
School success broadly	.01
School success academically	.08
Teachers' rating of other teachers	.10

It can be seen from Table 5 that there is not a strong relationship between any of the teacher variables and student engagement. This is possibly because these variables have an indirect rather than a direct effect on engagement, for example that they affect another factor, which in turn affects student engagement. However these relationships and possibilities are not explored in this report. The strongest correlation is teachers' rating of other teachers; that is whether the teachers feel that most of the other teachers in their school are experts in their subject matter and good communicators with their students.

School-level variables

Table 6 shows that the correlations between school-level variables and student engagement are moderate for independent schools and for single-sex schools (as this is a dichotomous variable, a negative correlation for coeducational schools is the same as a positive correlation for single-sex schools). Weaker negative correlations can be seen with school size, implying that engagement decreases as school size increases.

Table 6 Correlations with engagement for school-level variables

	Correlation with Engagement
School size	-.07
Non-government school	.12
Coeducational school	-.12

Summary

This section of the report has provided an overview of the student, teacher and school variables and their associations with student engagement. There is a number of student demographic and background characteristics that are associated with higher and lower levels of engagement. As previous research has shown, engagement levels amongst young males are lower than for females. Both parental education and occupation are associated with engagement. Occupational background, as measured by the ANU3 occupational prestige scale, has a weak correlation with engagement. Also related to socioeconomic status, parents' educational level is strongly associated with engagement. Students who have tertiary educated parents have, on average, higher levels of engagement than those from families with lower levels of parental education.

Of the attitudinal variables, the strongest correlations were found for engagement and

- perception of school climate,
- intrinsic motivation,
- positive affect.

Only weak correlations were found between student engagement and any of the teacher variables. The strongest was found for teachers' rating of other teachers, indicating that a students' sense of engagement may be related to a mutual sense of confidence among teachers.

Finally, for the school-level variables, school size was found to have a weak negative correlation with engagement, indicating that students at smaller schools show higher levels of engagement. There is probably more pressure on students at small schools to participate in a variety of activities. Engagement is strongest in independent schools and single-sex schools, which may well be confounded with socioeconomic status and with parents' educational level.

In the next section of this report, multilevel modelling techniques are used to examine school-level differences in student engagement, accounting for background and other student and school-level factors.

4. INDIVIDUAL AND SCHOOL – LEVEL EFFECTS ON STUDENT ENGAGEMENT

As discussed previously, modelling the effects of both student-level and school-level variables on student engagement necessitates the use of multilevel (or hierarchical linear) modelling techniques[3]. Students are grouped or nested within schools, and standard regression analysis will result in smaller standard errors and possibly incorrect conclusions. Analysis of school-level variables at the individual student level will result in aggregation bias, underestimating the effects of those variables that are estimated at the inappropriate level, while aggregating student-level data to the school level fails to fully capture the effects of variables such as achievement that may operate at both levels of analysis. For example, achievement measured at the student-level is an indicator of a student attribute, whereas school-average achievement at the school-level becomes a proxy measure of a school's normative environment. In other words, the average achievement level of a school has an effect on a student above and beyond the effect of their own individual achievement.

MLM techniques allow researchers to model student-level outcomes within schools and then to identify and model any between-school differences that occur (Bryk & Raudenbush, 1992). By decomposing any observed relationships into separate between-school and within-school components, confounding of relationships can be avoided and the correct interpretation of empirical relationships can be made. The analyses in this section of the report were carried out using MLwiN (Rasbash et al., 2000).

Engagement

The outcome variable for this investigation is student-level engagement, and under investigation in this chapter is the extent to which this engagement varies between schools. As well, school-level engagement is used as a predictor variable in the multilevel modelling, and the use of this variable requires careful thought.

The measure of engagement at the student-level provides an in-context indicator of the student's school experience. At the school-level, engagement becomes a proxy, contextual measure of a school's normative environment. Clearly, the average engagement of students within a given school (and its variance) may have an effect on students above and beyond the effect of an individual's engagement. Multilevel analysis resolves the confounding of these two effects by facilitating a decomposition of any observed relationship among variables into separate within-school and between-school components. Indeed, the inclusion of computed contextual or group averages of this kind are commonly undertaken by researchers who have realised that such decomposition can be critical to correct interpretations of relationships (e.g. Goldstein, 1987, 1993; Raudenbush & Willms, 1991, Rowe & Rowe, 1999, Willms, 2000).

School-level engagement is constructed from student-level engagement scores; it is a school-level average of individual student's scores, calculated as a multilevel average by the MLwiN program. Each student within a particular school will have an identical value for this school-level engagement, and it is useful to begin identifying schools whose practices somehow act to boost levels of engagement for students who might otherwise be disengaged.

Variance Components model

The initial model was fitted to estimate the extent to which engagement is related to individual schools (Appendix 5 provides technical details of this procedure). Of the total variation in engagement, 8.9 per cent was found to be due to between-school differences. This is highly

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[3] The support of Dr Ken Rowe is gratefully acknowledged for his guidance in the analysis and reporting of the sections of this report on construct measurement and multi-level modelling.

significant, and, with the finding of considerable variation at school- and student-level, indicates the necessity of carrying out multilevel analysis. The figure of 9 per cent is consistent with the findings of Lee, Chen & Smerdon (1996, p. 21). Figure 6 depicts the results of a residuals[4] analysis at the school level, showing the ranked mean point estimates of schools' engagement scores, bounded by 95% confidence (uncertainty) intervals. A key feature of the data shown in Figure 6 is that there is greater variability *within* schools than *between* schools. It is also clear that there is a group of schools with high levels of engagement and a group with low levels of engagement; these are significantly different, as their confidence intervals do not overlap. This provides a starting point for further research, in which the differences between these two groups of schools could be further explored.

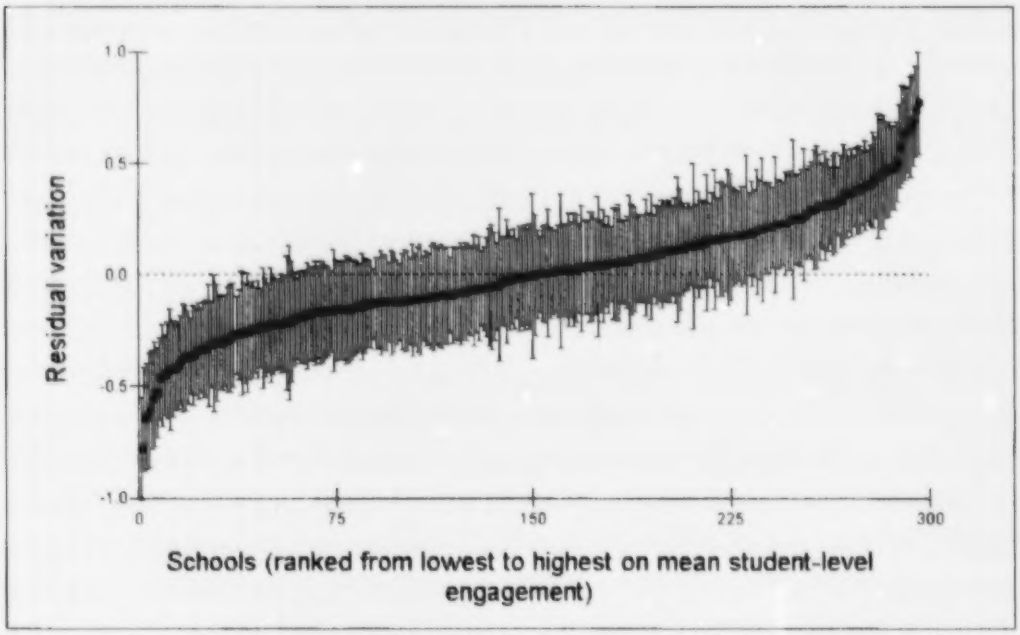

Figure 6 Residuals of school-level *Engagement* scores, ranked for 296 schools, showing 'error bars' for 95% confidence intervals

Four models were used to understand the direct and indirect effects of background and school factors on engagement. Each successive model added a further set of explanatory factors to the previous model. The first model included the group of student background variables, the second model added a set of attitude variables and prior achievement, the third model added a group of teacher variables averaged to school-level and the fourth model added two school-level contextual variables. Finally *School-level Engagement*, as a multilevel average, was included in the model to examine the effects of school-level engagement over and above the effects of the other factors on student-level engagement.

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[4] A useful way of interpreting a residual in this context is that it represents what remains after adjusting for factors that might influence or explain student's engagement.

Student background and school contextual factors

The parameter estimates for the first model are shown in the second column of Table 7. Student sex, socioeconomic status (as measured by the ANU3 occupational prestige scale), Indigenous status, parents' educational level, home language, parents' country of birth, student's aspirations were added to the basic equation. In addition several school-level variables were included, such as the gender mix of the school and size of school.

Overall, 8.9 per cent of variance in engagement was accounted for by the variables in this model, with 5.6 per cent of residual variance at the school level and the remaining 94.4 per cent at the student level. The change in the log-likelihood statistic was significant, indicating that this model was a significantly better 'fit' than the null model.

The strongest effect on engagement is student's gender. The parameter estimate (0.35) divided by the standard error (0.03) yields a *t*-value of 11.7, which is significant at the $p < .001$ level. Females are a great deal more engaged than males, that is they are much more likely to be participating in a wide range of school-related activities. Strong effects were also found for independent schools ($t = 3.3$) compared to government schools and for single-sex schools compared to coeducational schools ($t = 3.86$).

Socioeconomic status and parents' educational level were strong predictors of engagement, with students from higher socioeconomic levels and with well-educated parents being more likely to be engaged. It is likely that parents who are well educated were themselves engaged with schooling, and see the benefits of participation in extracurricular activities.

Student's aspirations show a significant, strong positive effect, with students who aspire to tertiary education showing significantly higher levels of *Engagement* than those who plan to work immediately after finishing school.

A negative effect was found for indigenous status, indicating lower levels of engagement among those students of Aboriginal and Torres Strait Islander background. However home language and parents' country of birth were not found to be significant predictors, indicating that allowing for the other variables in the equation, engagement levels are not significantly different for those from non-Australian backgrounds.

As an equity issue, one would hope that the latter would indeed be the case. *Engagement* in schooling and participation in extracurricular activities should not be predicated on being part of the cultural majority. Thus the strong negative effect of indigenous status is of some concern, as is the strong effect of high socioeconomic status and of independent schools. These warrant close examination as more factors are added to the model.

Student attitudes and achievement

The third column of Table 7 provides the estimates for Model 2, in which the student attitudinal variables and prior achievement in maths and English is added. The variables in this model account for 15 per cent of the variance in *Engagement*, with 6 per cent of the residual variance at school level.

Perceptions about school climate (rating of the school on quality of teaching, effective discipline, student learning and school spirit) were found to have a significant effect on engagement. Those who rated their school highly were more likely to have higher levels of engagement. Similarly, self-concept of ability was found to be a moderately strong predictor, so that those students who believed themselves academically capable compared to their peers were more likely to be involved in a variety of extracurricular activities.

Table 7 Parameter estimates and standard errors for the analysis of student engagement (students within schools)

Explanatory variables	Model 1	Model 2	Model 3	Model 4
FIXED				
Intercept	**.32 (.13)**	**.34 (.14)**	.23 (.16)	.08 (.14)
Student-level variables				
Sex	**.35 (.03)**	**.33 (.03)**	**.34 (.04)**	**.27 (.03)**
Socioeconomic status	**.06 (.02)**	**.05 (.02)**	**.05 (.02)**	.03 (.02)
Indigenous status	**-.24 (.11)**	**-.31 (.12)**	**-.25 (.13)**	-.22 (.13)
Parents' educational level	**.08 (.02)**	**.06 (.02)**	**.07 (.02)**	**.06 (.02)**
Home language	.02 (.07)	-.03 (.07)	-.08 (.08)	-.11 (.08)
Parents' country of birth	-.02 (.02)	-.03 (.02)	.01 (.03)	-.01 (.03)
Student's aspirations	**.11 (.02)**	.00 (.02)	.01 (.03)	.00 (.03)
Class climate		.03 (.02)	**.04 (.02)**	.03 (.02)
School climate		**.10 (.02)**	**.09 (.02)**	**.07 (.02)**
Self-concept of ability		**.14 (.02)**	**.15 (.03)**	**.13 (.02)**
QSL Intrinsic motivation		**.08 (.03)**	**.08 (.03)**	**.09 (.03)**
QSL Opportunity		-.02 (.02)	-.02 (.02)	-.02 (.02)
QSL Achievement		.02 (.02)	-.02 (.03)	.01 (.02)
QSL Positive Affect		**.06 (.03)**	**.06 (.03)**	.04 (.03)
Achievement		-.02 (.02)	-.03 (.02)	-.04 (.02)
School-level variables				
Catholic school	-.08 (.07)	-.10 (.07)	-.09 (.08)	-.09 (.06)
Independent school	**.23 (.07)**	**.20 (.07)**	**.29 (.09)**	-.02 (.07)
Coeducational school	**-.27 (.07)**	**-.20 (.07)**	**-.18 (.08)**	.04 (.06)
School size	**-.09 (.02)**	**-.08 (.02)**	**-.11 (.03)**	-.04 (.02)
Classroom climate			.04 (.03)	.00 (.02)
School climate			-.01 (.07)	-.03 (.05)
Problems with school			.02 (.09)	.01 (.06)
Parental involvement			.02 (.06)	.04 (.04)
Satisfaction resources			.02 (.04)	.01 (.03)
Satisfaction workload			-.03 (.04)	-.01 (.03)
Satisfaction management			-.04 (.07)	-.01 (.04)
Satisfaction students			.04 (.10)	-.05 (.07)
Relationships with others			-.04 (.09)	.01 (.06)
School success broadly			**.09 (.04)**	.02 (.03)
School success academically			.02 (.08)	.02 (.05)
Teachers' rating of other teachers			.04 (.06)	.01 (.04)
School-level Engagement				**.31 (.02)**
σ_u^2 (between schools)	**.05 (.01)**	**.05 (.01)**	**.05 (.01)**	.00 (.00)
σ_e^2 (between students)	**.84 (.02)**	**.78 (.02)**	**.77 (.02)**	**.76 (.02)**
-2 log-likelihood[5]	11131.30	8793.85	7455.57	7298.14
p	< .001	< .001	< .001	< .001

[5] The significance in the difference in the –2 log-likelihood is tested using a Chi-squared statistic, where the degrees of freedom are based on the number of variables added to the equation. The significance (or *p*-value) is noted in the table although the Chi-square statistics are not.

The two *Quality of School Life* scales for intrinsic motivation and positive affect also had positive effects on engagement. These variables can be seen to have strong independent effects on student's engagement, however they also transmitted or relayed the effects of the different student background and contextual variables. This is evident from the drop in the sizes of the parameter estimates for gender, student's aspirations, independent schools and coeducational schools in particular. This tells us that not only do gender, attendance at an independent school and attendance at a single-sex school have independent effects on engagement, they also have a transmitted effect through their influence on perceptions of school climate, self-concept of ability, intrinsic motivation and positive affect.

School level factors

The addition of the next group of variables - teacher attitudes - had little impact, as can be seen in the fourth column of Table 7. The variables in this model account for 16.4% of the variance in engagement, with 6 per cent of the residual variance at school level. Only one of the teacher attitudes had a significant impact on student engagement.

Teacher's belief that their school was broadly successful was found to be a significant predictor of student engagement. This variable relates to teachers' assessments on the success of their school in such things as *providing a curriculum that caters for all students*. It would seem that a strong feeling among teachers that the school is inclusive and successful is a positive influence on student engagement.

The fifth column of Table 7 presents the final model in this data analysis; that in which school-level engagement was added into the equation. The variables in Model 4 account for 21.8 per cent of the variance in *Engagement*, with all of the residual variance at student level. It should be remembered that a school's average level of *Engagement* acts as a proxy level-2 contextual variable, that represents a school's normative environment. It can be see that the effect of this variable was strong and significant. While this is to be expected, given the manner in which the variable was constructed, what is important to note is the effect of this variable on others. High engagement at the school level appears to moderate the negative effects of socioeconomic status and indigenous status, and the magnitude of both effects declines to the extent that neither is statistically significant (ie the *t* value calculated as the ratio of parameter estimate to standard error is not significant). This finding suggests that schools with high average levels of student engagement increase the likelihood of extracurricular participation of indigenous students and those students from low socioeconomic status. This is a particularly important finding for educational policy. School policies on participation in extracurricular activities, indeed school policies on the provision of such activities, are policies that are readily amenable to change by the school community itself.

Students' perceptions of school climate, self-concept of ability and level of intrinsic motivation all remain as significant predictors of engagement, as does gender and parents' educational levels. The effects of independent schools on engagement are completely removed, as are the effects for single-sex schools.

Other influences on school-level engagement

School-level engagement appears to be an important influence on the engagement levels of the students within the schools. This variable represents, as best we can measure it through these data, a school 'ethos' of participation. There are a number of other factors at the school level that may also have some influence on engagement, such as whether the school is single-sex or coeducational, the size of the school, whether the school is a government, independent or Catholic school, and the mean socioeconomic level of students in the school.

To estimate the effects of these variables on school-level engagement, a multilevel model was fitted to the data with school-level engagement as the outcome variable (Table 8). Almost 9 per cent of the between-schools variation was able to be explained by this model. The parameter estimates shown in Table 8 suggest that the two factors that have the greatest influence on overall school levels of engagement were the gender mix of the school and the size of the school. Single-sex schools show higher levels of engagement than coeducational schools, and smaller schools than larger schools. Also significant but with a much smaller effect, was average school socioeconomic status. This finding indicates that schools with higher socioeconomic status are more likely to have higher levels of engagement than those schools with lower average socioeconomic status.

These findings are intuitively correct; schools with more resources are better able to provide such activities to their students, and the parents of higher socioeconomic level students are more likely to be able to provide the financial resources necessary for their children to participate in a broad range of extracurricular activities. The positive finding for single-sex schools is worthy of further investigation. Only 3 per cent of government schools, but 63 per cent of Catholic schools and 40 per cent of non-Catholic independent schools in the LSAY sample are single-sex.

Table 8 Parameter estimates and standard errors for the analysis of school-level engagement

Explanatory variables	Model 1
Intercept	**1.49 (.05)**
School-level variables	
Average socioeconomic level (ANU3)	**.05 (.02)**
Size of school	**-.07 (.02)**
Catholic school	-.08 (.05)
Independent school	.11 (.06)
Coeducational school	**-.23 (.05)**

Are influences on *Engagement* the same for males and females?

The effect of gender is the strongest of all predictors, other than school-level engagement. Females are much more highly engaged than males whatever other factors are included in the equation. It may be that there are different influences for males and females, however the effects for females are "swamping" those for males. Separate multilevel analyses were therefore carried out for males and females, using exactly the same indicators as for the whole group. The parameter estimates and their standard errors separately for males and females for each of the four models are presented in Table 9 and Table 10. The initial variance components models found that for both males and females, approximately 11 per cent of the residual variance was at school-level, again indicating that multilevel analysis is essential to account for the clustering effects of students within schools.

The second columns of Tables 9 and 10 show that, as expected, there are significant differences in the effects of the various contextual and background variables on engagement for males and females in the first model. The amount of residual variance explained by Model 1 was lowest for males, accounting for just over 3 per cent, while for females the model accounted for just over 7 per cent. For males, a little over 10 per cent of variance was at the school-level, while for females it was a little over 7 per cent.

For males, the strongest effect was for coeducational schools, indicating that males at coeducational schools had significantly higher levels of engagement than those males at single-sex schools. For females, this effect was not significant, however there was a suggestion that females at single-sex schools may have higher levels of engagement.

For both males and females, socioeconomic status had a significant positive effect on engagement, with the effect being stronger for females than for males. For both males and females, those from higher socioeconomic status families showed higher levels of engagement. As might be expected, parents' educational level also had a similar effect, with those students from families with higher levels of parental education having significantly higher levels of engagement.

School size was found to have a negative effect on engagement for females, but no effect for males. This indicates that females at smaller schools are more likely to have higher levels of engagement than those females at larger schools, however for males there was no difference according to the size of the school.

Student's aspirations were found to be a significant positive predictor of engagement for both males and females, with those who aspire to tertiary study having higher levels of engagement.

Non-significant predictors for either males or females were Indigenous status, home language, parents' country of birth, and attendance at a Catholic school. This tells us that, accounting for the effects of socioeconomic status, parents' educational level, and school sector or school type, there are no differences in engagement for indigenous students, for those for whom English is a second language or whose parents were born in non-English speaking countries, or for those at Catholic schools compared to government schools.

The third and fourth columns of Tables 9 and 10 show the developments in the models with each successive addition of groups of factors. These will not be examined in detail, however are provided for completeness. The addition of the student attitudinal variables and achievement remove the effect of socioeconomic status, student's aspirations and coeducational school that are seen in the initial model for males, and the effects of parents' educational level and student's aspirations for females.

The last column in each table provides the parameter estimates for whole-school engagement, and show that it has a very large and significant effect on engagement for both males and females, with the effect being larger for females.

Throughout the model, parents' educational level was found to be a significant effect for males, as was perceived positive school and classroom climate. These last two variables are of particular interest as they are amenable to change by schools. School climate is measured by perceptions of the quality of teachers, effective discipline, student learning and school spirit. Class climate is measured by perceptions of whether students in the class were eager to learn, made good progress, worked hard and were well-behaved. This finding means that for males, a structured and supportive school and classroom environment is particularly helpful to increase levels of engagement.

For females, socioeconomic status was found to be a positive predictor throughout the analysis. Of the attitudinal variables, self-concept of ability and school climate were the only significant predictors in the final model. For females, the factors most likely to improve engagement were a strong belief in their own ability in comparison to that of their classmates, and a belief that the school climate is positive and structured. Fostering both these types of beliefs in females increases their levels of engagement with school.

Table 9 Parameter estimates and standard errors for the analysis of student engagement (students within schools) for males

Explanatory variables	Model 1	Model 2	Model 3	Model 4
FIXED				
Intercept	**-.59 (.19)**	-.37 (.21)	-.25 (.23)	-.11 (.21)
Student-level variables				
Socioeconomic status	**.05 (.02)**	.03 (.03)	.02 (.03)	.01 (.03)
Indigenous status	-.15 (.16)	-.19 (.18)	-.26 (.18)	-.27 (.18)
Parents' educational level	**.05 (.02)**	**.07 (.02)**	**.07 (.02)**	**.07 (.02)**
Home language	.08 (.10)	.01 (.11)	-.04 (.11)	-.05 (.11)
Parents' country of birth	.00 (.03)	.03 (.04)	.03 (.04)	.02 (.04)
Student's aspirations	**.07 (.02)**	.02 (.03)	.02 (.03)	.02 (.03)
Class climate		**.06 (.03)**	**.07 (.03)**	**.07 (.03)**
School climate		**.16 (.03)**	**.16 (.03)**	**.12 (.03)**
Self-concept of ability		.06 (.04)	.03 (.04)	.03 (.04)
QSL Intrinsic motivation		.05 (.04)	.07 (.04)	.07 (.04)
QSL Opportunity		-.03 (.03)	-.03 (.03)	.02 (.03)
QSL Achievement		.03 (.03)	**.04 (.04)**	.05 (.04)
QSL Positive Affect		.07 (.04)	**.07 (.04)**	.04 (.04)
Achievement		-.01 (.03)	-.01 (.03)	-.05 (.03)
School – level variables				
Catholic school	.13 (.11)	.08 (.11)	.11 (.13)	.08 (.11)
Independent school	.10 (.10)	.00 (.10)	-.01 (.15)	.01 (.12)
Coeducational school	**.20 (.09)**	.15 (.09)	.12 (.10)	-.02 (.08)
School size	.02 (.03)	.02 (.03)	.03 (.03)	.02 (.03)
Classroom climate			**.07 (.03)**	.03 (.03)
School climate			**-.37 (.13)**	-.17 (.11)
Problems			**-.30 (.13)**	-.05 (.11)
Parents			.15 (.07)	.09 (.07)
Satisfaction resources			-.11 (.08)	-.06 (.07)
Satisfaction workload			-.07 (.10)	-.11 (.08)
Satisfaction management			-.01 (.08)	-.01 (.06)
Satisfaction students			**.27 (.13)**	.09 (.10)
Relationships			-.09 (.13)	.00 (.10)
School success broadly			-.06 (.06)	.02 (.05)
School success academically			.18 (.12)	.02 (.10)
Teachers' rating of other teachers			**.24 (.07)**	.11 (.06)
School-level Engagement				**.29 (.03)**
σ_u^2 (between schools)	**.09 (.02)**	**.06 (.02)**	**.04 (.02)**	.00 (.00)
σ_e^2 (between students)	**.82 (.03)**	**.75 (.03)**	**.74 (.03)**	**.73 (.03)**
-2 log-likelihood	4791.48	3701.21	3243.07	3166.36
p	< .001	< .001	< .001	< .001

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Table 10 Parameter estimates and standard errors for the analysis of student engagement (students within schools) for females

Explanatory variables	Model 1	Model 2	Model 3	Model 4
FIXED				
Intercept	.23 (.20)	**.61 (.21)**	.36 (.23)	.09 (.21)
Student-level variables				
Socioeconomic status	**.10 (.02)**	**.08 (.02)**	**.08 (.03)**	**.06 (.02)**
Indigenous status	-.27 (.16)	-.32 (.17)	-.16 (.18)	-.11 (.18)
Parents' educational level	**.04 (.01)**	.02 (.01)	.02 (.02)	.01 (.01)
Home language	-.08 (.10)	-.08 (.10)	-.10 (.11)	-.15 (.11)
Parents' country of birth	-.02 (.03)	-.05 (.03)	-.03 (.04)	-.03 (.04)
Student's aspirations	**.08 (.02)**	-.01 (.03)	.01 (.03)	.00 (.03)
Class climate		.01 (.03)	.02 (.03)	.01 (.03)
School climate		**.08 (.03)**	**.06 (.03)**	**.06 (.03)**
Self-concept of ability		**.16 (.03)**	**.17 (.03)**	**.15 (.03)**
QSL Intrinsic motivation		**.08 (.04)**	.07 (.04)	.07 (.04)
QSL Opportunity		-.03 (.03)	-.03 (.03)	-.02 (.03)
QSL Achievement		-.02 (.03)	-.03 (.03)	-.02 (.03)
QSL Positive Affect		**.08 (.03)**	**.08 (.04)**	.06 (.04)
Achievement		-.02 (.03)	-.03 (.03)	-.04 (.03)
School-level variables				
Catholic school	-.09 (.09)	-.11 (.09)	-.04 (.10)	-.04 (.08)
Independent school	**.23 (.09)**	**.26 (.09)**	**.38 (.11)**	.05 (.09)
Coeducational school	-.15 (.10)	-.12 (.09)	-.11 (.10)	**.20 (.07)**
School size	**-.10 (.03)**	**-.09 (.03)**	**-.12 (.03)**	-.04 (.03)
Classroom climate			.01 (.03)	-.01 (.03)
School climate			.02 (.08)	-.01 (.07)
Problems			.04 (.11)	.03 (.08)
Parents			.11 (.07)	.05 (.06)
Satisfaction resources			.04 (.04)	.02 (.03)
Satisfaction workload			.04 (.05)	-.02 (.04)
Satisfaction management			-.08 (.08)	-.02 (.06)
Satisfaction students			.17 (.12)	.14 (.09)
Relationships			.04 (.11)	.04 (.08)
School success broadly			.05 (.05)	.00 (.04)
School success academically			.11 (.10)	.07 (.08)
Teachers' rating of other teachers			.02 (.07)	.01 (.05)
School-level Engagement				**.34 (.03)**
σ_u^2 (between schools)	**.06 (.01)**	**.04 (.01)**	**.04 (.01)**	.00 (.00)
σ_e^2 (between students)	**.82 (.03)**	**.76 (.03)**	**.75 (.03)**	**.72 (.03)**
-2 log-likelihood	5924.36	4647.95	4037.25	3917.49
p	< .001	< .001	< .001	< .001

In the final model, a very strong and significant effect was found for females attending coeducational schools. This effect was not found for males. Females in coeducational schools, taking into account other factors in the model, showed higher levels of engagement. It is important to recognise that this effect is only observed after allowing for school-level engagement. This means that in schools of the same average level of engagement there is a benefit for girls in coeducational environments, however for males there is no difference between coeducational and single-sex environments, given schools of the same average level of engagement.

Summary

This chapter has explored a number of multilevel models to explain school-level variance in student engagement. While the amount of between-school variation is modest, it is sufficient to warrant multilevel modelling techniques to account for the hierarchical structure of the data: students within schools. The following provides a summary of the key findings for this chapter.

- School-level engagement was found to be the most important factor in individual students' levels of engagement. The final model used throughout this chapter found this variable to be the strongest predictor of engagement.
- Gender was found to be the next strongest predictor of engagement. Females were more engaged than males whatever other variables were entered into the model.
- The following factors remained significant predictors of engagement for all students as a group, controlling for all other factors in the model:
  - Parents' educational level;
  - School climate;
  - Self-concept of ability; and
  - Intrinsic motivation.
- School size was a significant negative predictor of individual level engagement. That is, students in smaller schools tend to have higher levels of engagement than students in large schools.
- Positive effects were found for independent schools and single-sex schools prior to the addition of the whole-school engagement variable. Given whole-school engagement, however, there were no differences found for the whole sample for either school sector or for school type. Whole school engagement appears to have the effect of removing these differences.

A separate multilevel analysis was conducted to examine the predictors of school-level engagement.

- The strongest factors in influencing school-level engagement were found to be gender mix of the school, size of the school and average socioeconomic status of the school. The data indicates higher levels of engagement in single-sex schools as compared to coeducational schools, smaller schools and in schools with high socioeconomic levels.

Due to the size of the effect for gender, the same techniques were applied to the data separately for males and females. With the effects for females being so strong, it was thought that they might act to 'swamp' the effects for males in the combined analysis. The significant findings from these analyses were:

- For both males and females, but more strongly for females, whole-school engagement was the most significant predictor of individual engagement.

- The significant predictors along with whole-school engagement were found to be:
  for males
  - Parents' education level
  - Classroom climate
  - School climate

  and for females:
  - Socioeconomic status
  - Self-concept of ability
  - School climate
  - Coeducational school.

That there are differences between the significant predictors for males and females is an important finding. It has implications for school policies if schools wish to increase the levels of engagement amongst males and females in their schools. The final chapter explores these findings and their implications in a broader context.

5. DISCUSSION AND POLICY IMPLICATIONS

What are the important outcomes of schooling? For more than one-quarter of the students in school today, and for a greater proportion of some social groups, it is not a tertiary entrance rank; these students will leave school before such issues become a reality for them. For instance around 10 per cent of students leave before completing Year 10 at school, and of those young people, a disproportionate number are low achievers, boys, indigenous (Marks & Fleming, 1999), or from low socioeconomic status families (Lamb et al., 2000). On a practical level, young people who do not complete secondary school are more likely to experience periods of unemployment, to find jobs in a narrow field of occupations and to be more reliant on government income support, compared to their peers who do complete Year 12.

Many young people leave school early for reasons other than to find work; a significant minority leave because they fail to see the relevance of school to them. Many have, over a period of time, become alienated from education and from the schools in which they are enrolled. While this disengagement or alienation might be seen in terms of dropping out or problematic behaviour at school, it might also be seen in terms of failure to achieve potential. Some students simply endure thirteen years of schooling at minimum participation levels. If we are to encourage lifelong learning skills in students then we need to address low engagement with school.

This report draws on Finn's (1989) taxonomy of engagement or participatory behaviours. The third level in this taxonomy is the student's participation in extracurricular activities, which may be the primary source of attachment to school for those whose academic performance is weak. Finn argued that the likelihood of a student completing secondary schooling is maximised if the student "maintains multiple, expanding forms of participation in school-relevant activities"(p. 117).

This report has examined individual and school effects on engagement. Four key questions were examined:

- What is the influence of socioeconomic background on student's engagement levels?
- What is the influence of background factors such as gender on student's engagement levels?
- To what extent can student engagement be attributed to the differences between schools?
- What are the factors that affect a student's engagement with school?

Firstly, it was found that socioeconomic background did indeed affect students' engagement levels. Measured by the ANU3 occupational prestige measure, the correlation with engagement was weak but positive. However there is a strong possibility that the effect of socioeconomic status is multiple, in that it also affects the school that a student attends and therefore the environment that a student is exposed to. In the context of this study, it also affects the financial resources that a family has available to allow young people to participate in a wide range of activities at school, or to attend a particular school which has a strong focus on students' participation.

Gender was found to be a strong influence on student's engagement, with females showing significantly higher levels of engagement than males; in all school sectors, in coeducational as well as single-sex schools, and at all achievement levels.

Several of the affective variables from the *Quality of School Life* scales exerted an effect on engagement, and weak correlations were also found between a number of the teacher variables and school variables and engagement.

To examine the second and third questions, multilevel modelling techniques were used. Almost 9 per cent of the variation in student engagement was found to be due to between-school differences. Whilst this is not large, it is highly significant, and indicates that it *does* matter what school a child goes to. A number of models were then fitted to these data to try and identify the particular variables that affect students' engagement, and to identify the variables at school level that affect school-level engagement. The findings indicated that gender was a strong predictor of engagement. Whatever other variables were entered into the model, gender remained one of the strongest influences.

School-level engagement, however, was found to be the strongest influence on engagement. This variable represents, as best we are able to measure it with these data, a school 'ethos' of participation. It is an average for a school, and as such, there are deviations from the mean that would provide a starting point for further qualitative research studies. The level of engagement within a school was found to vary significantly between schools, and was found to be higher in single-sex schools, small schools, and in schools with higher levels of socioeconomic status.

Allowing for whole-school engagement, a number of other variables were found to remain as significant influences on individual-level engagement. Gender, parents' educational level, perceptions of school climate, self-concept of ability, and intrinsic motivation were all found to have a significant effect on individual engagement over and above that of whole-school engagement. The effect of gender was found to be particularly strong, and so the analysis was repeated separately for males and females.

Different predictors were found when the analysis was conducted separately for males and females, indicating that for males, the strongest predictors of engagement, apart from overall high school-levels of engagement, were parents' educational level and perceptions of classroom and school climate. For females, the next strongest predictors were socioeconomic status, self-concept of ability, perceptions of school climate, and attendance at a coeducational school.

These are important findings from a policy perspective. Often, educational research finds that the factors that have the greatest influence on student outcomes are those that are not readily amenable to change, such as socioeconomic status or prior achievement. In this study, however, the focus on extracurricular activities provides an avenue that *is* amenable to change.

Firstly, the promotion of participation in extracurricular activities is one that is easily influenced by school administrations. Creating an environment at school where there is a wide variety of extracurricular activities provided, in which students are *expected* to participate in a variety of such activities, and are encouraged strongly in this participation, will lift personal levels of engagement with school. Further research into the practices of schools in the independent sector could be of benefit to understanding the influence of school-level policies on participation in extracurricular activities.

Marsh (1992) has shown us that such high levels of engagement "have positive benefits across a wide variety of educationally relevant outcomes for students across a wide variety of educationally relevant backgrounds" (p. 559). In particular as a long-term benefit, young people who participate in a variety of extracurricular activities are those who are more likely to be involved in voluntary social and community activities as young adults (Lindsay, 1984). Finn (1989) argued that schools need to actively promote extracurricular participation, and recognise it as a means of promoting high levels of student attachment to school. He points to deleterious school policies such as:

> Policies that exclude the youngster from extracurricular participation, detentions that don't involve school-related work, and suspensions, make it more difficult for the individual to maintain regular contact with the school environment. For a student in this situation, dropping out may seem to be a very small step (Finn, 1989, p. 131)

Secondly, the findings are important because they isolate several differences in factors affecting the engagement of males and females that can be manipulated by schools. For males, attention in schools needs to be paid to classroom and school climate. Males appear to need more of a supportive school and classroom environment to be engaged with their school. They need to be strongly encouraged by their schools and by their parents to participate in extracurricular activities, and a broader range of activities developed by schools that are appealing to young males.

For females, schools need to focus on developing a strong self-concept of ability and positive views of school climate. Whilst for males, parents' educational level, and for females, socioeconomic status, are not malleable, their effects are small compared to the effects of overall high levels of school engagement.

This report has indicated that it *does* matter which school a student attends. Students at schools which have the resources or the commitment to provide a broad range of extracurricular activities and encourage students to participate, generally have higher levels of engagement than those in schools which do not. Strong participation in such activities leads to a student's closer connectedness to the school community, and it is argued that there are 'flow-on' effects to more academic parts of the curriculum. As an equity issue, it is important that this be addressed. Socioeconomic status is a persistent influence on participation, both at the individual level and at the school level. At present, students with parents who have the financial resources to allow a wide participation in extracurricular activities obtain a benefit from schooling that those students with less access to financial resources do not.

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Appendix 1: Samples and populations

The Sample

The sample is a national representative sample of Year 9 students in 1998. It is a stratified random sample. The major stratum in the design was State (or jurisdiction) of schooling. Students from smaller States were to be over-sampled and, correspondingly, students from larger States were under-sampled. Selection of students within States was proportional by school sector. Three sectors were used as strata: government schools, Catholic schools and non-government, non-Catholic (referred to as independent) schools. The population data for strata were taken from the *Schools Australia* series (ABS). Within strata, schools were selected proportional to their size. Information on the number of Year 9 students in each school came from ACER's Sampling Frame which, in turn, was based on information provided by the relevant State authorities and, in the case of non-government schools, by the Federal Department of Educational, Training and Youth Affairs (DETYA). These figures were from the 1997 annual school census. Within schools two classes were randomly selected (again, proportional to their size). Schools were asked for a list of the number of students enrolled in each of their Year 9 classes for a subject studied by all Year 9 students in the school (usually English classes).

The 1998 data was collected from self-completion questionnaires that the students were asked to fill out at the time they undertook the achievement tests in literacy and numeracy. The 1999 data was collected with mailed questionnaires. This form collects basic information on participants' educational and labour force activities over the previous 12 months and contact details for subsequent telephone-based interviews. In the second year after the initial survey contact (by which time sample members are normally in Year 11) the method of data collection changes to Computer-Assisted Telephone Interviewing (CATI).

Cases were weighted to correct for the disproportionate sampling between strata and to correct for the variation between strata due to differential response rates and variable class sizes. Additional weights were constructed to compensate for sample attrition. Further details on the general weighting procedures can be found in LSAY Technical Paper Number 15 (Marks & Long, 2000).

Appendix 2: Description of individual-level variables

Socioeconomic status

Responses to questions about parents' occupations were assigned occupational status scores based upon the ANU3 scale. The ANU3 scale ranges from 0 (low status) to 100 (high status). This scale assigns status scores based on average income and educational levels, to some 300 occupational groups. Examples of jobs at the top of the status hierarchy are medical practitioners, university teachers and legal professionals. Examples of jobs at the bottom of the status hierarchy are various mining, construction and related labourers, forklift drivers, cleaners and product assemblers (Jones, 1989).

To make the best use of available information, the occupation of the male parent/guardian was taken as the basis for the occupational measure. Where information was missing on the male parent the occupation of the female parent/guardian was substituted. This approach was taken because a large proportion of respondents indicated that the occupation of the female parent was 'home duties', an occupation for which there is no occupational prestige score.

Parent's educational level

The measure of parental education was based on student's self-reports of the highest level of education that both parents had attained. Mother's education was taken as the base measure, which, if missing, was replaced by father's education.

Home language

Home language was based on student's self-reports of the primary language spoken at home. In these analyses it was treated as a simple dichotomy in which students whose primary home language was English were contrasted with students for whom it was not.

Parents' country of birth

This measure was based on father's country of birth. A respondent was defined as *Australian* if their father was born in Australia, *Other English speaking country* if their father was born outside Australia in a predominantly English-speaking country, and *Non-English* if their father was born in a predominantly non-English speaking country.

Student's aspirations

Students' educational aspirations were measured in Year 10 by the student's responses to the question " what do you plan on doing after leaving school?" Four categories were used, representing those who had no post-school study plans, those who planned to do an apprenticeship, those who planned on TAFE or other study options, and those who planned to attend university.

School sector

This measure refers to school system attended in Year 9. Three categories are used- government schools, Catholic schools and Independent non-Catholic schools. Dummy variables were created for Catholic schools (coded as 1 with government schools coded as 0) and for independent schools (coded as 1 with government schools coded as 0).

Gender mix of school

This measure refers to whether the student attended a single-sex or coeducational school in Year 10. No distinction is made in these analyses between single-sex male and female schools. A dichotomous variable was created for gender-mix (with coeducational schools coded as 1 and single-sex schools coded as 0)

Achievement

Students were asked to complete tests on literacy and numeracy when they were first contacted in 1998. From their answers in these two tests

three measures were constructed: achievement in literacy in Year 9; achievement in numeracy in Year 9; and combined achievement in literacy and numeracy in Year 9.

The combined measure of achievement in literacy and numeracy represents an overall measure of early school achievement. The scores for the literacy and numeracy tests were centred about the means and summed to produce a combined measure of achievement. For the presentation of means and boxplots the continuous measure was split into four categories, based upon quartiles of achievement (that is, the highest quartile represents the top 25 per cent of students, then next quartile represents the next 25 per cent of students, and so forth).

Appendix 3: Factor score regression weights

Table A1 Factor score regression weights for all constructed variables

Scale	N*	Item weights								
Student-level		en1	en2	en3	en4	en5				
Engagement	8452	.098	.286	.339	.298	.193				
		cl1	cl2	cl3	cl4					
Classroom climate	8452	.239	.301	.370	.181					
		sc1	sc2	sc3	sc4					
School climate	8860	.249	.242	.399	.218					
		scon1	scon2	scon3						
Self-concept of ability	10743	-.045	-.037	1.072						
Quality of School Life		im1	im2	im3	im4	im5	im6			
– Intrinsic motivation	10174	.221	.078	.347	.088	.269	.186			
		op1	op2	op3	op4	op5	op6			
– Opportunity	10258	.131	.228	.188	.307	.070	.214			
		ach1	ach2	ach3	ach4	ach5	ach6			
– Achievement	10258	.104	.240	.246	.161	.170	.262			
		pa1	pa2	pa3	pa4	pa5	pa6			
– Positive affect	10124	.154	.181	.297	.214	.216	.071			
School-level		ccl1	ccl2	ccl3	ccl4					
Classroom climate	1698	.307	.320	.339	.078					
		sccl1	sccl2	sccl3	sccl4					
School climate	1678	.264	.337	.353	.090					
		pro1	pro2	pro3						
Problems	1677	.174	.102	.031						
		par1	par2	par3	par4					
Parents	1699	.153	.185	.342	.419					
		sr1	sr2	sr3	sr4					
Satisfaction- resources	1686	.070	.121	.796	.042					
		sw1	sw2	sw3	sw4					
Satisfaction -workload	1661	.284	.549	.161	.092					
		sm1	sm2	sm3						
Satisfaction- management	1696	.228	.320	.473						
		ss1	ss2	ss3	ss4					
Satisfaction-students	1698	.160	.308	.307	.318					
		rel1	rel2	rel3						
Relationships with others	1711	.278	.348	.433						
		bss1	bss2	bss3						
Broad school success	1695	.561	.341	.143						
		sas1	sas2	sas3	sas4	sas5	sas6	sas7	sas8	sas9
School academic success	1659	.103	.109	.072	.208	.114	.075	.157	.164	.131
		rate1	rate2	rate3	rate4	rate5	rate6			
Rating of other teachers	1695	.072	.224	.198	.119	.173	.301			

[a] N= the number of cases with complete data

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Appendix 4: Constructed student and school-level measures

Student-level

Perceived class climate

This was measured in the Year 10 questionnaire by asking students to respond to four items which asked "*How would you describe most of your classes?*"

- Students are eager to learn,
- Students are make good progress,
- Students work hard and
- Students are well behaved.

Perceived school climate

Students' perceptions of their school climate were measured in a similar manner in the Year 10 questionnaire. Students were asked "*How would you rate your school on each of the following?*"

- Quality of teachers,
- Effective discipline,
- Student learning and
- School spirit.

Self-concept of ability

A measure relevant to the continuation of school past the compulsory level is a student's self-concept of ability. The variable representing this self-concept of ability is a combination of the student's self-report of their ability in relation to their classmates in

- English,
- mathematics and
- overall.

Quality of School Life

The ACER Quality of School Life Questionnaire has been used in a number of studies in different contexts over several decades. The form used in the LSAY 1998 survey and used in these analyses asked students about their life at school. They were asked to respond to *My school is a place where ...* for the following scales

Positive affect (General well-being)

- I feel happy
- I like learning
- I enjoy being there
- I like to go
- Learning is fun
- I feel safe and secure.

Intrinsic motivation (self-motivation in learning)

- The work we do is interesting
- I like to ask questions
- I enjoy what I do
- I like to do my best
- I get excited about the work we do
- I like to do extra work

Opportunity (student's belief in the relevance of learning)

- We learn important things
- The work is good preparation for the future
- We learn useful skills
- We get a chance to do interesting work

- The things we learn will help in adult life
- The things I am taught are worthwhile learning

Achievement (student's sense of success in school work)

- I have learnt to work hard
- I achieve a satisfactory standard in my work
- I always achieve a satisfactory standard in my work
- I know how to cope with the work
- I know I can be successful
- I am a success as a student

School-level

Classroom climate

A measure which examines teachers' perceptions of the climate in their Year 10 classes. It consists of responses to *In your Year 10 class* for the items:

- Students are eager to learn
- Students make good progress
- Students work hard
- Students are well-behaved

School climate

A measure which examines teachers' perceptions of the climate in their schools. It consists of responses to *In your school* for the items:

- Students are eager to learn
- Students make good progress
- Students work hard
- Students are well-behaved

School problems

This measure asks the teacher to what extent there are problems at the school such as

- Student absenteeism
- Family problems of students
- Vandalism of school property
- Low rates of academic achievement
- Poor student behaviour
- Verbal abuse of teachers
- Lack of student interest in school
- Lack of parental interest in school affairs
- High staff turnover

Parental involvement

This measure looks at the level of perceived parental involvement with

- school decision making,
- participation in school activities such as helping with excursions and camps, and sport
- parent-teacher evenings
- general support of the school's goals

Satisfaction with workload

This measure asks for teachers' level of satisfaction with items such as

- workload
- out-of-class duties
- amount of committee work
- class sizes

Satisfaction with resources

This measure looks at teacher's satisfaction with

- access to teaching resources
- buildings and facilities
- teaching equipment
- grounds and sports facilities

Satisfaction with management

Asks about teacher satisfaction with

- support from management
- style of management
- decision making

Relationships with others

Asks teachers about their perceptions of the strength of relationships

- between teachers
- between teachers and the principal
- between teachers and parents

Academic success

Asks teachers to rate items such as *How successful is your school in*

- achieving good academic results
- teaching good communication skills
- preparing students for higher education
- engaging students in school life
- helping students plan for their careers
- providing an all-round education
- providing a broad range of co-curricular activities
- preparing students to be active and informed citizens

and a rating of the school as an effective learning community.

Broad success

Asks teachers to rate items such as *How successful is your school in*

- providing a curriculum that caters for all students
- teaching skills useful in employment
- meeting the needs of disadvantaged groups

Rating of Teachers

This group of items asks teachers to rate most teachers in their school on

- mastery of their subject matter
- ability to communicate well with students
- being able to maintain student interest
- managing discipline
- respecting students as young adults
- establishing a good learning environment.

Appendix 5: Multilevel models

To examine the effects of different variables on student engagement, several multilevel models were tested, adding successively to each a new group or layer of variables. Initially, a variance components model was fitted to obtain a baseline for subsequent models. The purpose of this model was to estimate the proportion of variance in *Engagement* due to the clustering effects of students (level-1) within schools (level-2). Using the subscript i to refer to the student and j to refer to the school, the model may be written in two parts:

a within-schools, among students part - $y_{ij} = \beta_{0j}x_0 + e_{ij}$, [Equation 1]
and a between-school part - $\beta_{0j} = \beta_0 + u_{0j}$. [Equation 2]

From Equation 1, y_{ij} (Engagement) is the dependent or response score for student i in school j. The intercept β_{0j} in this within-school relationship is the average level of student's engagement for school j, and e_{ij} is a random variable – assumed to have a mean of zero – representing the sum of all influences on y_{ij}. The x_0 term in Equation 1 is a column vector of unities representing the constant slope (intercept) for schools. From Equation 2, the coefficient β_{0j} is the mean engagement of students in the sample of schools, and u_{0j} is a residual that varies randomly between schools. Since β_{0j} may vary across schools, it is treated as a random variable at level 2.

By combining Equations 1 and 2, a single equation version of the model can be written as follows:

$y_{ij} = \beta_{0j}x_0 + (u_{0j} + e_{ij})$, [Equation 3]

where $\beta_{0j}x_0$ is the fixed part of the model and the bracketed residual terms at level 2 (u_{0j}) and level 1 (e_{ij}) constitute the random part of the model. Substituting the parameter estimates found in the variance components model into Equation 3, we can now write:

y_{ij} (Engagement) = $\beta_{0j}x_0$ (-.01, .02)+ u_{0j} (.09, .01)+ e_{ij}(.88, .01).

These results indicate that the ratio of the parameter estimates to their standard errors for the school – (σ_{u0}^2) and student – level residual variances (σ_{eij}^2) are both very large (i.e. 9 and 88 respectively), indicating significant and stable variation at these levels.

LONGITUDINAL SURVEYS OF AUSTRALIAN YOUTH (LSAY)

The *Longitudinal Surveys of Australian Youth* (LSAY) program studies the progress of cohorts of young Australians between school, post-secondary education and training, and work. The oldest cohort was born in 1961, while the youngest was a nationally representative sample of Year 9 students selected in 1998.

The program is jointly managed by the Australian Council for Educational Research (ACER) and the Commonwealth Department of Education, Science and Training (DEST), with the cooperation of government and non-government schools and school authorities in all States and Territories.

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Name:	Margaret Findlay
Signature:	M. A Findlay
Organization:	Australian Council for Educational Research
Position:	Manager, Cunningham Library
Address:	Private Bag 55 Camberwell Vic 3124 Australia
Zip Code:	3124
Telephone No:	61 3 92775549
Fax:	61 3 92775500
E-mail:	findlay@acer.edu.au
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